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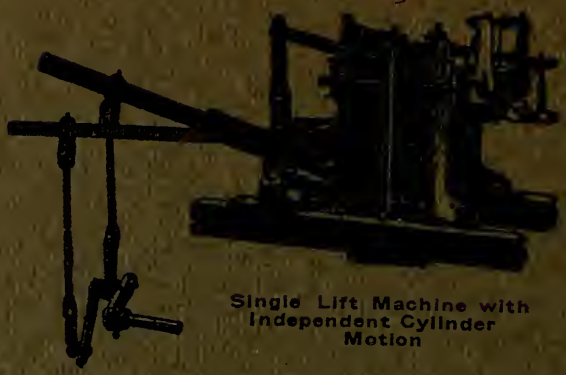

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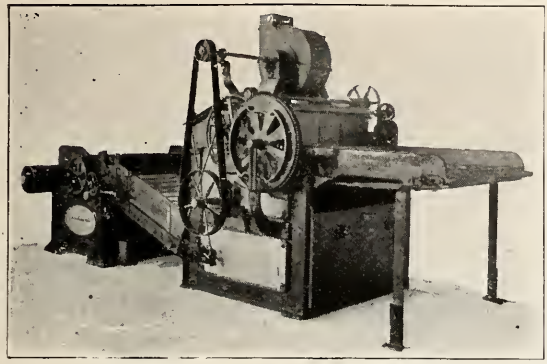

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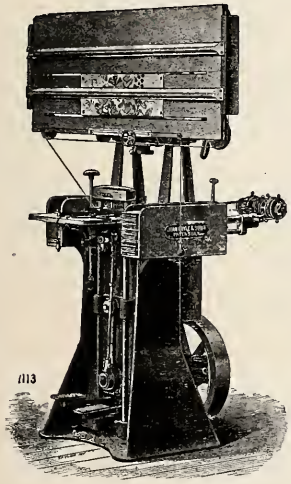

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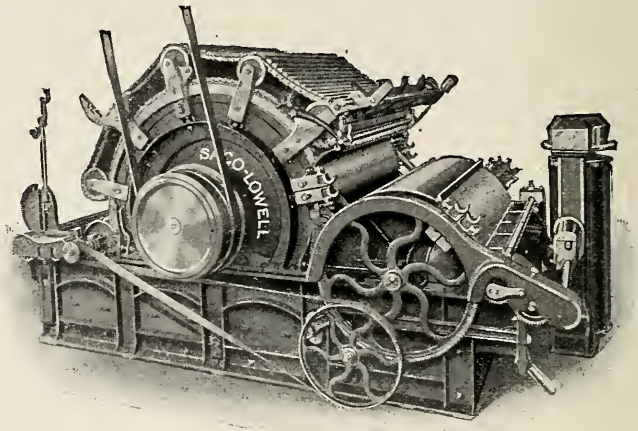

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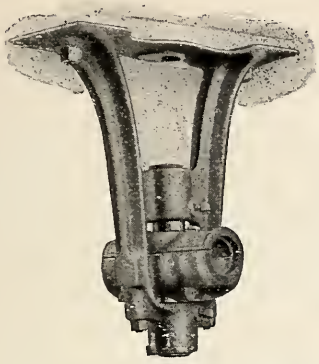

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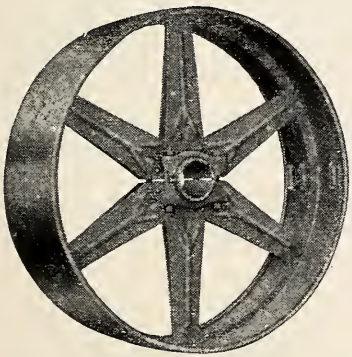

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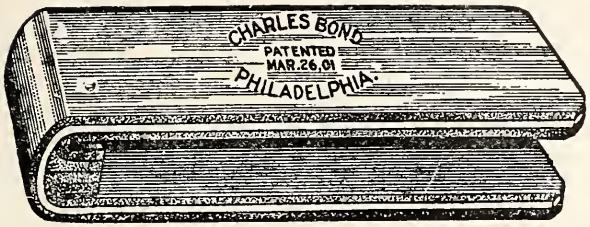

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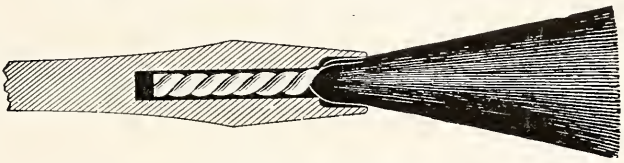

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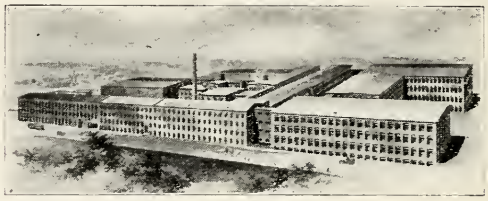

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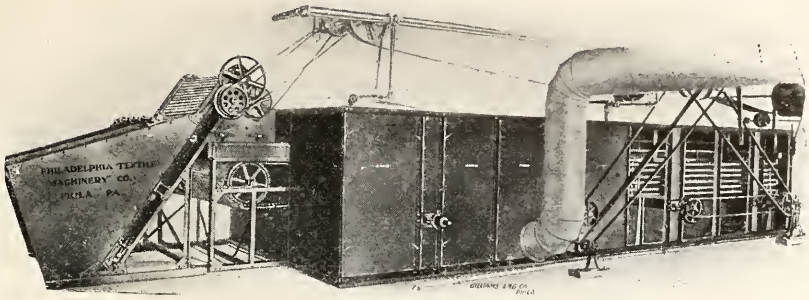

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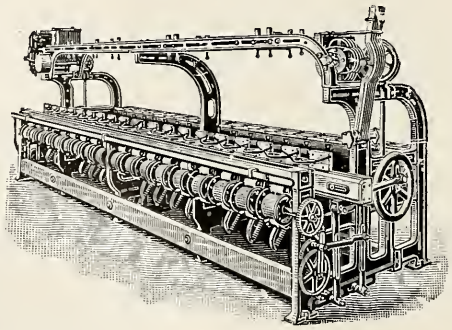

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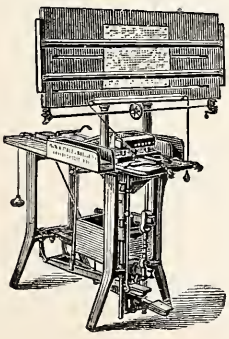

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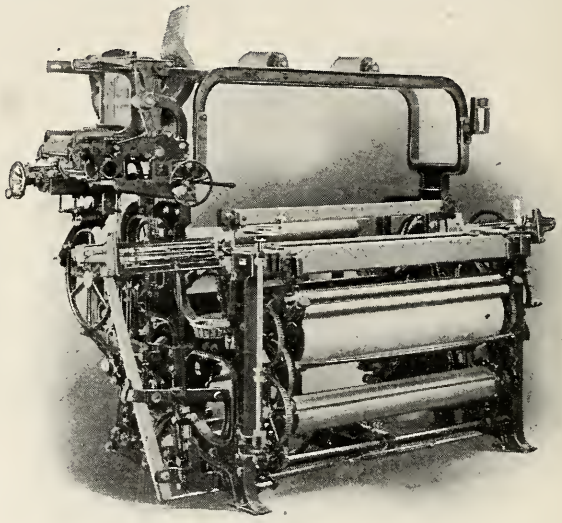

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JOHN R. BEATTY, of Robert Beatty & Co., Philadelphia, Manufacturers of Fine Combed Hosiery Yarns.

CHAS. BOND, of Chas. Bond Co., Philadelphia, Textile Mill Supplies and Power Transmission Equipment.

EDWARD P. BORDEN, Dry Goods Commission Merchant (retired).

H. H. BOSWORTH, Pres. } Delaine Mills Mfg. Co., Philadelphia, Pa.,
WILLIAM STEELE, Sec. } Manufacturers of Fine Worsted Fabrics.

E. K. BREADY, Manufacturer of Cotton and Wool Novelty Dress Goods.

WM. BURNHAM, President and Treasurer of Standard Steel Works, Philadelphia, Pa.

JOHN BURT, formerly President and Gen. Manager of Southwark Mills Co., Philadelphia, Pa., Manufacturers of Suitings, Dress Goods and Cloakings.

HARRY E. BUTTERWORTH, of H. W. Butterworth & Sons, Philadelphia, Manufacturers of Bleaching, Dyeing, Printing, Drying and Finishing Machinery.

RICHARD CAMPION, Philadelphia, Worsted Yarns. Selling Agent for Bristol Worsted Mills, Highland Worsted Mills and French Worsted Co.

JOHN G. CARRUTH, Manufacturer of Woolen Cassimeres, Dress Goods, Worsted Suitings, etc.

ROBERT DORNAN, } of Dornan Bros., Philadelphia, Manufacturers of
BENTON DORNAN, } Carpets, Art Squares, etc.

WALTER ERBEN, } of Erben, Harding Co., Manufacturers of Fine Worsted
CHAS. HARDING, } Mohair, Merino and Genapped Yarns.

WILLIS FLEISHER, Firm of Shelbourne Mills Co., Philadelphia, Manufacturers of Worsted Men's Wear.

B. W. FLEISHER, of S. B. & B. W. Fleisher, Philadelphia, Worsted and Wool Spinners and Braid Manufacturers.

ALBERT FOSTER, of the firm of Firth and Foster Co., Philadelphia, Dyers and Finishers.

WM. T. GALEY, JR., Aberfoyle Corporation, Chester, Pa., Manufacturers of Fine Fancy Cotton Shirtings, Ginghams, Madras, Leno and Novelty Fabrics.

JOS. R. GRUNDY, of the firm of Wm. H. Grundy & Co., Bristol, Pa., Top Makers and Worsted Spinners.

THOS. S. HARRISON, formerly of Harrison Bros., Philadelphia, Manufacturing Chemists.

GEO. C. HETZEL, of Geo. C. Hetzel & Co., Chester, Pa., Manufacturers of Worsted and Woolen Suitings and Dress Goods.

GEORGE H. HODGSON, Agent, Cleveland Worsted Mills, Cleveland, Ohio, and Rowland Worsted Mills, Philadelphia, Pa., Manufacturers of Ladies' Dress Goods, Men's Suitings, Plain and Fancy.

GEORGE HUTCHINS, General Superintendent, Crompton & Knowles Loom Works, Worcester, Mass.; Providence, R. I., and Philadelphia.

EDWARD JEFFERSON, Firm of Edward Jefferson & Bro., Philadelphia, Pa., Importers of Worsted Machinery.

JOHN STORY JENKS, formerly of Randolph & Jenks, Philadelphia, Manufacturers of Plain and Fancy Cottons.

H. S. LANDELL, General Manager, Buffalo Dye Works, Philadelphia, Pa.

JOHN H. McFADDEN, of the firm of Geo. H. McFadden & Bro., Philadelphia, Cotton Brokers.

THEODORE MILLER, of the firm of Stead, Miller & Co., Philadelphia, Drapery and Upholstery Manufacturers.

WILLIAM C. ROBB, Philadelphia Representative of Farbwerke Hoechst Co., New York, N. Y. (formerly H. A. Metz. Co.).

EDWARD ROSSMÄSSLER,
WALTER ROSSMÄSSLER, } of the Sauquoit Silk Mfg. Co., Philadelphia.

OTTO SCHAUM,
W. H. ROMETSCH, } of Schaum & Uhlinger, Philadelphia, Manufacturers of Weaving Machinery for all kinds of Narrow Fabrics.

MITCHELL STEAD, Superintendent of Folwell Bros. & Co., Philadelphia, Manufacturers of Coat Linings, Fine Dress Goods, etc.

JAMES STEWART, Superintendent of Caledonian Mills Co., Clifton Heights, Pa., Manufacturers of Cheviots and Cassimeres.

WALTER SYKES, of the firm of Sykes Bros., Philadelphia, Manufacturers of Carpet Yarns.

ALBERT TILT, Secretary and Treasurer of the Phœnix Silk Mfg. Co., Allentown, Pa.

J. P. WOOD, of Wm. Wood & Co., Philadelphia, Manufacturers of Woolen Cassimeres, Cheviots, Unions, Serges, etc.

CALENDAR—SCHOOL YEAR 1914=1915

SEPTEMBER

Thursday, 24th—Examination for Admission to Day Classes.

Friday, 25th,
Saturday, 26th, } Registration days.

Monday, 28th—Sessions of Day Classes begin.

Wednesday, 30th, 7 P. M.—Registration of Students in Evening Classes.

OCTOBER

Monday, 5th—Sessions of Evening Classes begin.

Saturday, 10th—Saturday Class begins. (Art School).

NOVEMBER.

Thursday,
Friday,
Saturday, } Thanksgiving Holidays, School closed.

DECEMBER

Monday, 21st,
to
Saturday, Jan. 2d, } Christmas Holidays. School closed.

JANUARY

Monday, 4th—School re-opens.

MARCH

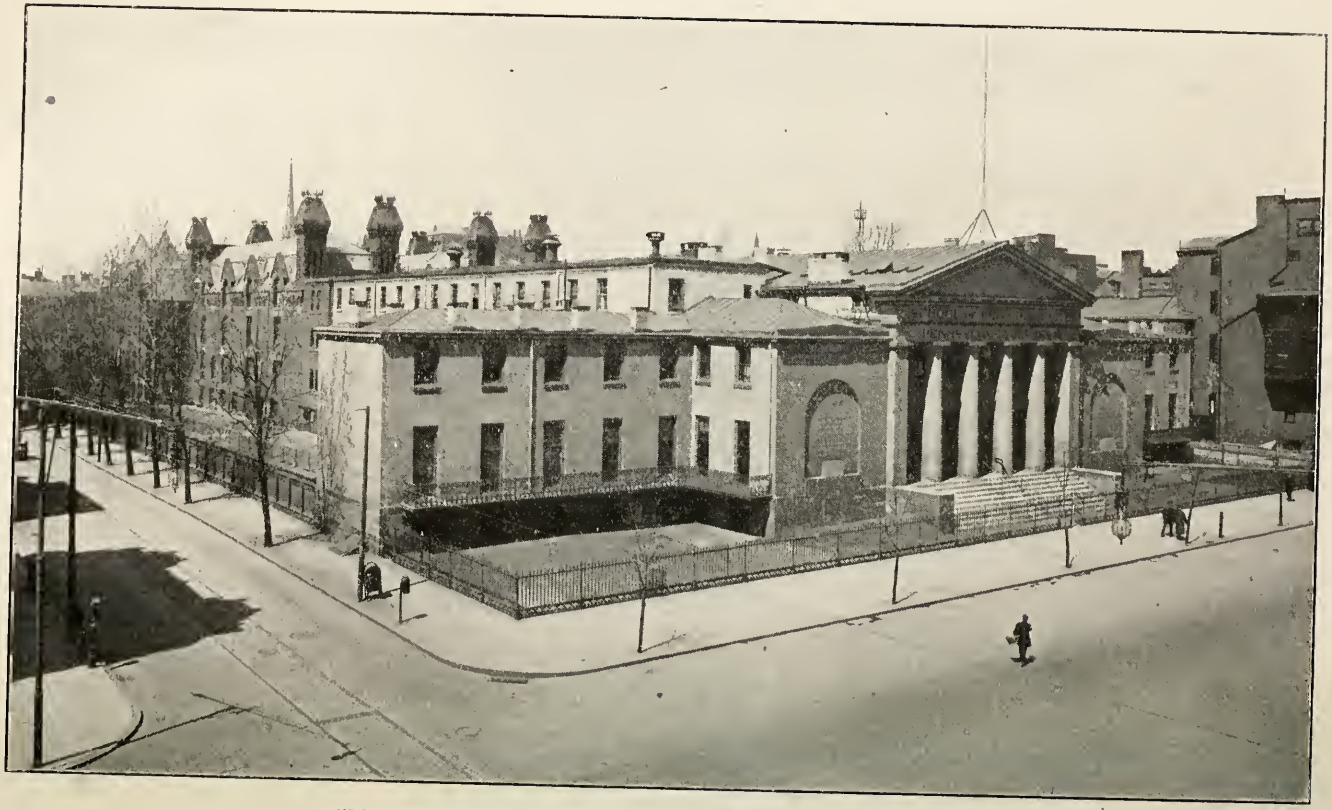
Wednesday, 31st—Sessions of Evening School end.

APRIL

Good Friday,
to
Easter Monday, inclusive, } Easter Holidays. School closed.

JUNE

Thursday, 3d—Annual Commencement and Exhibition.



VIEW OF ADMINISTRATION BUILDING FROM BROAD AND PINE STREETS.

STAFF OF THE TEXTILE SCHOOL

L. W. MILLER,
Principal of the Schools of Industrial Art.
Lecturer on Historical Ornament and Principles of Design.

E. W. FRANCE,
Director of Textile School.
Lecturer on Raw Materials, Processes and Fabrics.

BRADLEY C. ALGEO,
Assistant Director, and Professor in Charge of Weave Formation, Analysis and Structure of Fabrics.

L. DA COSTA WARD,
Professor in Charge of Chemistry and Dyeing.

LAWRENCE A. STEAD,
Assistant Professor in Chemistry.

ELMER C. BERTOLETT,
Instructor in Dyeing.

LEON HOFFMAN,
Instructor in Chemistry.

WILLIAM PFEIFFER,
Instructor in Charge of Advanced Weaving and Related Branches.

WM. A. McLAIN,
Instructor in Charge Elementary Weaving and Related Branches.

CASEMIR J. MEKSZRAS,
Assistant in Power Weaving and Related Branches.

JOHN LOCKWOOD,
Instructor in Charge of Wool Carding and Spinning, Worsted Drawing and Spinning.

F. M. JENNINGS,
Instructor in Wool Grading and Sorting.

ELWOOD B. WRIGHT,
Assistant in Wool Carding and Spinning, Worsted Drawing and Spinning.

JAMES S. DIMENT,
Instructor in Charge of Cotton Carding and Spinning.

JOHN NAAB,
Instructor in Charge of Knitting and Silk Manufacturing.

RICHARD S. COX,
Instructor in Charge of Jacquard Design, Drawing and Color Work.

FRANK A. ROTH,
Assistant Instructor in Jacquard Design and Color Work.

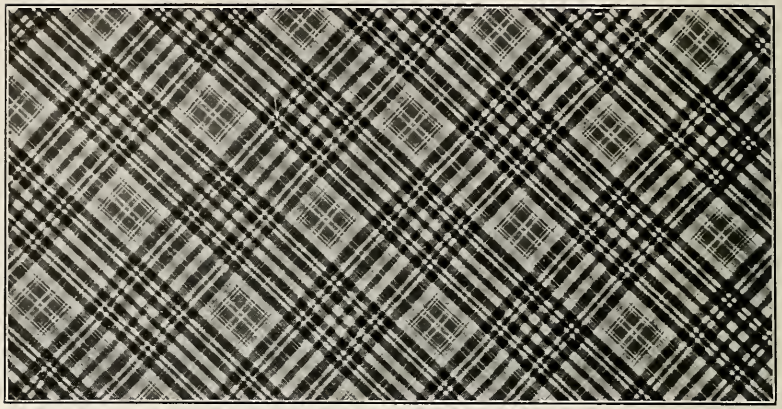
CARL MAJER,
Instructor in Free-Hand Drawing.

ALFRED BURHOUSE,
Instructor in Wool and Worsted Cloth Finishing.

FRANK L. GIESE,
Assistant in Design and Elementary Weaving.

JAMES L. ALLAN
Registrar.

CLARA M. NACE,
Secretary.



FINE SCOTCH GINGHAM. MADE OF BEST COMBED YARN, 2/90'S QUALITY.

All the details of manufacture, including designing, dyeing, warping and weaving, performed by the student.

FINE SILK BROCADE (200 ENDS PER INCH), GROUND BUFF SATIN, WITH EMBOSSED FIGURES IN GOLD AND GREEN.

All the details of manufacture, including designing, card stamping and weaving, performed by the student.

Historical Sketch

of the

Pennsylvania Museum and School of Industrial Art

Origin and Purpose

The Pennsylvania Museum and School of Industrial Art, an institution the origin of which was due to the increased interest in art and art education awakened by the Centennial Exhibition, was incorporated on the twenty-sixth day of February, 1876, for the purpose, as stated in the charter, of establishing "for the State of Pennsylvania, in the City of Philadelphia, a Museum of Art in all its branches and technical applications, and with a special view to the development of the Art Industries of the State, to provide instruction in Drawing, Painting, Modeling, Designing, etc., through practical schools, special libraries, lectures and otherwise."

Location of Museum

The purpose of the institution as thus defined is distinctly industrial. The collections at Memorial Hall, in Fairmount Park, where the Museum is located, embrace examples of art work of every description. It was determined by the founders to make the collections of the Pennsylvania Museum as largely as possible illustrative of the application of art to industry, and the instruction in the school has had constant reference to a similar purpose.

Source of Original Collection

In the selection of objects, the trustees had the benefit of the advice of the foreign commissioners to the Exhibition, and, in several instances, the institution was the recipient of valuable gifts from individual exhibitors.

Around the nucleus thus formed, the Museum has grown by purchase, gift and bequest to its present proportions, numbering in its collections upwards of thirty thousand objects.

Recent Additions

The Museum possesses several special collections, sufficiently complete in themselves to be regarded as representative of the departments to which they belong. Of these, the collection of American pottery, made by Mr. Edwin A. Barber; the collections of coins and medals; the collections of Etruscan and Greco-Roman Pottery; the John T. Morris collection of glass; a collection of mediæval wrought iron and the collection of textiles, are perhaps the most important.

Loan Collections

In addition to its actual possessions, the Museum is constantly receiving accessions in the form of loans of a more or less permanent character, by which the element of freshness is secured, and popular interest in the collections continually renewed. The museum is visited by about 500,000 persons a year.

Opening of the School

The School was opened during the winter of 1877-78, in temporary quarters, at Broad and Vine Streets, in the building since known as Industrial Hall. It was removed in 1879 to the rooms of the Franklin Institute, at 15 South Seventh Street, and again, in 1880, to the building 1709 Chestnut Street, where it remained until its removal, in 1884, to 1336 Spring Garden Street.

Location of School

The munificent gift of $100,000, by Mr. Wm. Weightman, and the generous response of the public of Philadelphia to an appeal for assistance, by which a like amount was raised by popular subscriptions during the spring of 1893, enabled the institution to acquire the magnificent property at the northwest corner of Broad and Pine Streets, which it occupies at present. The property, with a front of 200 feet on Broad Street and 400 feet on Pine Street, is by far the most

spacious and most advantageous in its location of any establishment in America that is devoted to the uses of a school of art, situated as it is on the principal street and in the very heart of the city.

First Courses of Study General Only

Up to the time of the removal to Spring Garden Street, the work of the classes was confined to the general courses in Drawing, Painting and Modeling, with constant regard to the needs of the industries, it is true, but without attempting to provide instruction in any of the occupations themselves.

The necessity of affording facilities for such technical instruction, however, became apparent very early in the history of the School. It was seen that only by familiarizing the students with the processes and industrial applications of design could the proper direction be given to such purely artistic training as the School had to offer.

Additions to the Curriculum

Applied Design and Wood Carving were added to the curriculum in 1884, and the Philadelphia Textile School was organized in the same year. The Department of Chemistry and Dyeing was added to the Textile School in 1887, and the Class in Interior Decoration was added in 1892, at which time the Class in Architectural Design was also organized; the Departments of Wool Carding and Spinning and Cloth Finishing were added to the Textile School in 1894, that of Cotton Carding and Spinning in 1896. A Department of Worsted Yarn Manufacture was established in 1898, and those of Metal-Work and Pottery to the Art School in 1903.

The present organization of the School is as follows:

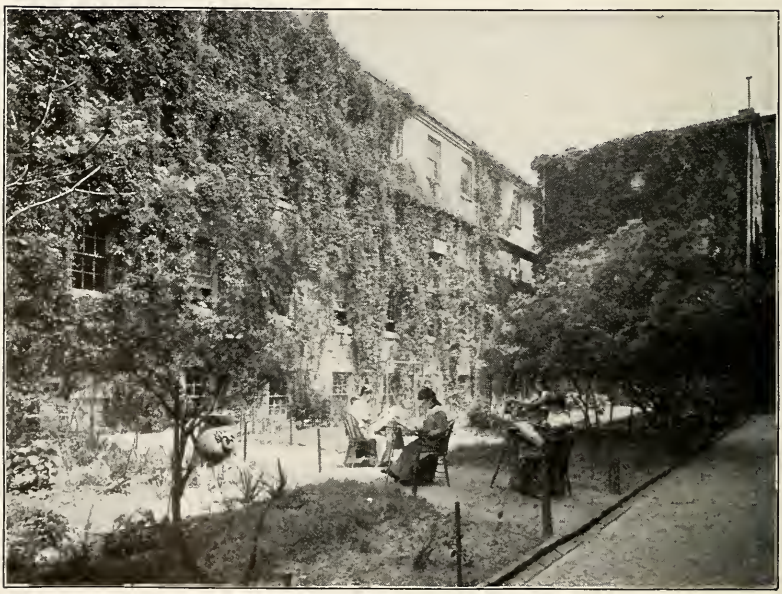
1. School of Applied Art, comprising the departments of:—

Drawing,
Applied Design,
Normal Art Instruction,

Wood Work and Carving,
Decorative Painting,
Illustration,
Decorative Sculpture,
Architectural Drawing and Design,
Metal Work,
Pottery.

2. PHILADELPHIA TEXTILE SCHOOL, comprising the departments of:—

Fabric Structure and Design,
Cotton, Wool, Worsted and Silk,
Warp Preparation and Weaving,
Color Harmony and Figured Design,
Chemistry, Dyeing and Printing,
Wool Yarn Manufacture,
Worsted Yarn Manufacture,
Cotton Yarn Manufacture,
Hosiery Knitting,
Finishing.



GARDEN IN THE CENTRAL COURT.

Honors Received by the School for Exhibits of Students' Work at Expositions

1884—The World's Industrial Cotton Centennial Exposition, New Orleans:
Diploma of Honor.

1893—The World's Columbian Exposition, Chicago:
Diploma of Honor—Bronze Medal.

1895—Cotton States and International Exposition, Atlanta, Georgia:
Diploma of Honor—Gold Medal.

1901—Pan-American Exposition, Buffalo:
Diploma of Honor—Silver Medal.

1902—South Carolina Interstate and West Indian Exposition, Charleston:
Diploma of Honor—Gold Medal.

1904—Louisiana Purchase Exposition, St. Louis:
Diploma of Honor—Gold Medal.

MEDALS AWARDED
BUFFALO
AWARDED TO
INTERSTATE AND WESTERN
COLUMBIAN EXPOSITION
1893
GOLD MEDAL
LOUISIANA PURCHASE
EXPOSITION
1904
CHRISTOPHER COLUMBUS
ORATION OF THE
DISCOVERY
A. MOORE. 07.

PHILADELPHIA TEXTILE SCHOOL

of the

Pennsylvania Museum and School of Industrial Art

Purpose of the School

The Philadelphia Textile School aims to give a technical education in all branches of the textile industry. Organized in 1884, its object from the start has been to fit young men for positions of responsibility in the manufacture and sale of textiles. The recent growth of the industry in this country has resulted not only in a larger number of mills, but also in a great increase in the size of the establishments, and a corresponding development of division of labor and specialization of production. This specialization has been carried so far that it has become virtually impossible for a general and comprehensive knowledge of the business as a whole to be obtained in the typical modern mill, and the young man who aspires to the possession of such knowledge must seek it elsewhere. It is apparent, then, that the causes which have so greatly increased the demand for the trained master, and those which have conspired to prevent his development in the mill itself, are one and the same, and the Textile School has come into existence simply to meet the advancing requirements of the textile trade.

Men were selected as instructors, not only on account of their fitness to teach, but because of their extensive and varied experience in a wide field of industry. The School does not aim to supplant practical experience, but it does claim to prevent waste of effort in unprofitable routine and to economize effort by properly directing it.

Location

Philadelphia possesses unequaled advantages as a home for a textile school, ranking first among the American cities in the total manu-

facture of textiles. This is not only true of textiles as a whole, but the leading position which it holds in various lines of textiles testifies to the diversity as well as to the importance of its industries.

The United States Census of 1910 gives the following:

"The State of Pennsylvania contains textile establishments with an invested capital of $242,281,000.

"Philadelphia's annual production of worsted yarns and fabrics is valued at $27,000,000; woolen yarns and fabrics valued at $15,000,000; carpets and rugs valued at $22,628,000; cotton goods valued at $22,603,000; silk and silk goods valued at $6,502,000; hosiery and knit goods valued at $23,970,000.

"Philadelphia contains 736 spinning, weaving and knitting establishments; upwards of 100 independent dyeing and finishing works; 128 raw wool dealers; 106 dealers in cotton, wool and worsted yarns; 80 chemical and dyestuff firms; as well as allied interests which contribute to its enormous production, embracing makers of machinery for spinning, weaving, knitting, dyeing, finishing, power transmission and mill supplies.

"There are 55 prominent men's wear and dress goods commission houses and selling agencies in the city; 100 jobbers in woolen, cotton and silk piece goods; 189 wholesale clothing and 104 women's suit and clothing manufacturers."

All of these, together with the large department stores, are, in themselves, educating factors of no mean importance. The opportunity of inspecting the ever-changing displays of these foremost retail establishments is of great value to the student, and is only one of the many advantages which a few years' residence in such a city is certain to possess for the ambitious student, apart from any immediate reference to the work of the school.

Environment

The importance of artistic effect in textile products cannot be overestimated, for it is this quality which first attracts the purchaser's attention. The School's association with the School of Applied Art

affords an exceptional opportunity for training in this all-important branch of the work. The buildings of the Schools are situated on the same plot of ground, on one of Philadelphia's main thoroughfares, in the heart of the city. The student may arrange for more or less artistic training in accordance with the requirements of his course of study, but in any event he works in an artistic atmosphere and profits by the refining influence which it exerts.

Historical

The Philadelphia Textile School, as before noted, was organized in 1884. It represents the most important effort which has yet been made in America to organize the instruction in an Art School, with direct reference to its application to the actual needs of the TEXTILE INDUSTRY.

The development and realization of this purpose were accomplished through the generous co-operation and support of the most energetic and influential members of the Philadelphia Textile Association.

Fostering Influence

This Association, formed in 1882, had kept prominent among the objects for which it was created, the fostering of technical education. At that time, no thorough school existed in this country, and it was necessary to begin at the foundation of the work, without previous knowledge of the exact methods to be adopted, or means to be employed to reach the desired end.

Mr. Search's Initiative

The initiative in this, as well as the work above described, was taken by Mr. Theodore C. Search, who was President of the Textile Association, as well as Vice-President and Chairman of the Committee on Instruction of the Pennsylvania Museum and School of Industrial Art. Indeed, he assumed at first the entire financial responsibility of organizing and equipping the Textile School, and to his devoted and untiring service in its behalf, from its first inception to its present high state of development, more than to all other agencies combined, its success is due. That the Association took the action that it did was mainly due to the example and leader-

ship of Mr. Search and a few members who were, like him, fully alive to the importance of the movement, notably, Mr. Thomas Dolan, Messrs. John and James Dobson, Mr. Wm. Wood, Mr. Wm. Arrott, Mr. John Yewdall, Messrs. Fiss, Banes, Erben & Co., Messrs. Conyers Button & Co., Messrs. George and James Bromley, Mr. Seville Schofield, Messrs. Alexander Crow & Son, Messrs. James Smith & Co., Messrs. M. A. Furbush & Son, Messrs. John Bromley & Sons, Mr.

Support of Manufacturers

MAIN EXHIBITION ROOM.

Here may be seen fabrics executed by students from their own designs. Fibres in all stages of preparation, dyestuffs and chemicals manufactured in the laboratory, etc.

Thomas L. Leedom, Messrs. James Doak, Jr., & Co., Messrs. Charles Spencer & Co., Messrs. H. Becker & Co., Mr. Andreas Hartel, Mr. S. B. M. Fleisher, Messrs. Grundy Bros. & Campion, Messrs. H. W. Butterworth & Sons, and Messrs. Stead & Miller.

Instruction

The School aims to make the instruction as practical as possible without losing sight of the fundamental principles which it is the main business of all education to impart. The instruction consists of lectures and class exercises, of individual investigation

and experiment, and the actual production of a great variety of textiles. These latter are brought out in commercial proportions according to the student's ideas and in accordance with specifications which he has himself planned in minute detail, the constant endeavor being to encourage originality and to direct research along profitable lines.

Facilities

The Institution possesses an extensive equipment unsurpassed by that of any similar institution in the world. It consists of the latest machinery for the manufacture of yarns, for weaving, finish-

ONE OF THE EXHIBITION ROOMS, SHOWING STUDENTS' WORK.

ing and dyeing. All of these machines are of commercial proportions, not mere working models, and they turn out work such as is met with in the best markets of the day. In addition to this practical equipment the different departments are provided with the apparatus necessary for conducting scientific tests and examinations of fibres, yarns, fabrics, dyestuffs, oils, waters, etc., with a view to locating the cause of possible defects. The buildings in which the School is housed are admirably suited to its purposes, affording light in quantities sufficient for the finest work, the top floors being skylighted throughout.

Scope

The breadth of the School's scope is the factor to which is due the greatest measure of its success. Silk, cotton, wool and worsted are studied exhaustively, and while some of the courses of study are so arranged that a student may confine his attention to the particular fibre in which he is most interested, the Regular or Diploma Course includes work in all of the materials mentioned above, allowing the student to specialize to a certain extent in the third year. Unquestionably the graduate of this course is fitted for better work in any one of these materials, because of a knowledge of the peculiarities and processes involved in the others. The best time to specialize is after a broad foundation has been laid.

The graduates who are most successful are those who have taken this comprehensive course, even though they may not have pursued it for the three years which its completion requires.

Day and Evening Classes

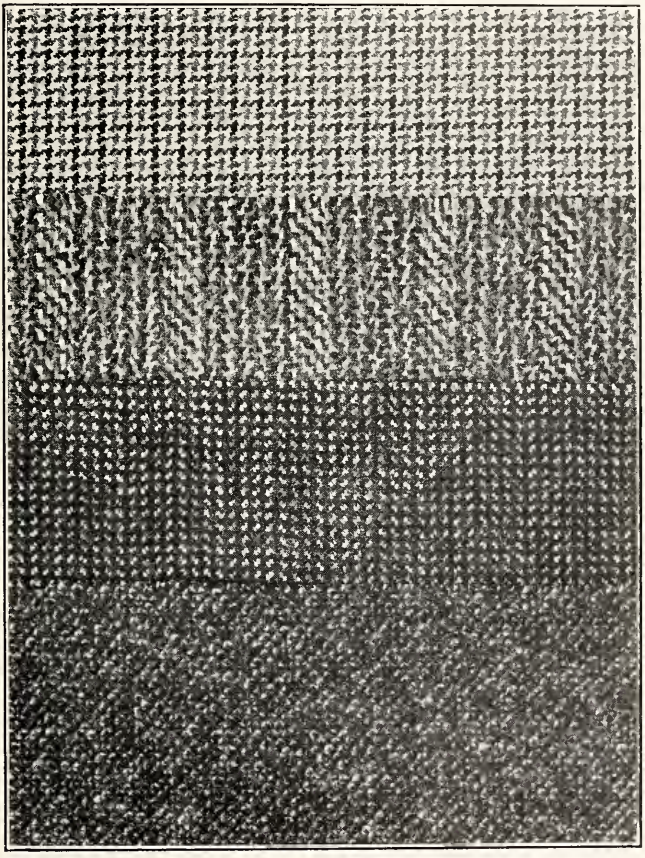
The organization consists of two distinct schools—day and evening. The course in the former requires the daily attendance of the pupil and involves a good deal of work outside of school hours, so that successful pursuit necessitates the giving up of other duties, although students of special subjects may take partial time in the School and attend to outside duties at other times.

The hours of the evening school are so few that the student's attention is necessarily confined to two or three subjects; the studies are, therefore, largely elective, although earnest effort is made to group these electives in the most profitable manner.

Students

The students of the day school come from all parts of the world. Some of them have had practical experience, and others come directly from schools and colleges, the latter having been largely represented in recent years. The advantages of a good preliminary education in enabling the possessor to obtain a quicker and better grasp of principles and to develop them to better purpose, are, of course, very great, but bright men who have

had mill experience often make admirable students even without the advantages of a high-school preparation. The students of the evening classes are, as a rule, engaged in some form of textile work, either manufacturing or commercial. Many of them come from a considerable distance.



SPECIMENS OF TYPES OF WOOL AND WORSTED FABRICS MADE BY STUDENTS.

Success of Graduates

The Philadelphia Textile School demonstrated the practical utility of technical education in textiles on this continent, and the steady growth of the Institution is due to nothing else, so much as to the success of its graduates. The broad and thorough educational policy steadfastly adhered to by those

who shape the School's character, has resulted in the graduation of a body of young men who by reason of the breadth of their training have been enabled to enter all fields of the work, and to-day they are well and favorably known in every textile section of any importance. They are in the mill, the dye-house, the commission house, and the machine builders, and wherever found they are proving themselves capable men and an honor to their alma mater.

The School does not undertake to find positions for its graduates, but inquiries for bright, energetic, well-trained men, are constantly being made, and it affords the officers only pleasure to furnish the assistance to employer and graduate, which introduction implies.

LECTURES

In addition to the lectures in the regular course of instruction, others are given from time to time on various topics bearing directly on the textile industries by various well-known men of the country. The names of these lecturers, their subjects and the dates of their lectures are duly announced during the term.

STUDENTS' CLUB ROOM.

SOCIAL FEATURES

The Art and Textile Club, to membership in which any member of School is eligible, is the exponent of the social and athletic side of the school life; and is conducted and supported by and for the students.

Its equipment includes a general club room with files of textile and other periodicals; tables for chess and checkers; pool tables; and a room with shower bath and lockers.

The membership fee is $3.00 a year, and is collected by the Registrar of the School from Textile day students when registering for the year. Night students are entitled to the privileges of the Club upon payment of $1.00 to either the Registrar or the Treasurer of the Club.

REQUIREMENTS FOR ADMISSION

Entrance examinations will take place on the last Thursdays of June and September, at 9 A. M. Applicants who find it inconvenient to present themselves on the regular dates may make arrangements with the Director for special days.

Applicants for admission should be at least 18 years of age, and are required to pass an examination to show that they possess a sufficient command of the common English branches to enable them to express themselves in a clear and accurate manner. This examination usually takes the form of a written statement or description of some topic with which they may be familiar.

The examination also covers common arithmetic, including fractions, decimals, square root, ratio and proportion, and percentage. It is of the utmost importance that the students should possess a ready command of these subjects, as they affect his school and subsequent textile life to a far greater extent than do the higher forms of mathematics. The attention of candidates from colleges and universities is especially directed to this fact, and a thorough review of arithmetic is urged.

Proficiency in free-hand drawing, although not a requirement for admission, is exceedingly desirable for all

textile students, whether their work be confined to design, or has to do with mechanics and machine study. It has been found, however, that owing to the limited opportunity for obtaining such proficiency during preparatory education and for other reasons, the average student has but slight ability in this line. The excellent opportunities afforded by the evening drawing classes of the School of Applied Art, located in an adjoining building, are earnestly recommended to the attention of the thoughtful student.

SCHOLARSHIPS

In consideration of an annual appropriation to the School by the Legislature of Pennsylvania, each county in the State is entitled to at least one free scholarship in any department of the School for the full course of three years. Counties sending more than one Senator to the Legislature are entitled to as many scholarships as there are Senatorial districts. These appointments are made by the Governor of the State, usually on the recommendatian of members of the State Legislature.

Generous provision for free instruction in this institution is also made by the Board of Public Education of the City of Philadelphia. Pupils of all the High and Manual Training Schools are eligible for these appointments, which are made by the Board of Education on the recommendation of the Principals of the several schools, to whom all applications for them should be addressed.

A certain number of scholarships have also been provided by the bequest of Mr. Joseph E. Temple, the Elisabeth Duane Gillespie Fund, and by gifts for this purpose by Mrs. Susan R. Barton, Mrs. William Weightman, Jr., Mrs. Chapman Biddle, Mrs. Frederic W. W. Graham, Mrs. John Harrison and by Miss Mary Williams and Mrs. Walter R. Stenger. These are awarded as prizes for meritorious work by students who have already spent at least one year in the School. Any of the above scholarships are subject to recall at any time, if, in the judgment of the Principal, the progress of the holder is unsatisfactory.

A student who fails to attend regularly or to do the work of his class, receives notice to this effect and is warned that unless a marked improvement is shown at once, the scholarship will be declared vacant.

He is usually given a reasonable length of time after the date of such notice in which to show that the warning has been heeded and has produced the desired effect. If, however, at the expiration of this time his progress still continues to be unsatisfactory, he is notified that the scholarship has been forfeited.

TUITION FEES AND OTHER EXPENSES

The tuition fee for any one of the following Day Courses is $160 per year of thirty-six weeks:

For the school year beginning September 27, 1915, this fee will be $175.

The fee for students from Foreign Countries is $300 per year.

Regular Textile (Diploma) Course,	see page 42	
" **Cotton Course,** . .	" " 62	See Deposits,
" **Wool and Worsted Course,**	" " 66	page 28
" **Silk Course,** . . .	" " 70	
Jacquard Design Course, . .	" " 75	See Tools
Yarn Manufacturing Courses, .	" " 81	and Materials
Chemistry, Dyeing and Printing		page 32
(Diploma) Courses, . .	" " 83	

INCIDENTALS

A departmental charge of $10.00 for incidentals is made upon all students whose course includes practical work in either of the departments of Carding, Spinning, Weaving, Chemistry, Dyeing, Printing or Knitting.

DIPLOMA FEE

The fee for the Diploma is $5.00, and is to be paid to the registrar upon request.

EVENING SCHOOL

Fees for either one of the Evening School Courses, as mentioned on page 107, is $15—(See "Deposits," page 108.)

PAYMENTS

All fees and deposits are payable in advance, and fees once paid will in no instance be refunded, except in case of serious illness, and then only by special action of the Instruction Committee. Students' tickets are issued on the payment of fees, and students will not be permitted to enter any class until the fees have been paid and the ticket obtained. Persons who desire to reserve a place in a class by entering before the opening day, may either pay the whole fee, or make a partial payment of $25, the balance being payable as above.

DEPOSITS—Day Students

All students of the Day School are required to make, upon entering, a deposit to cover breakage, laboratory charges, or damage to school property. After deducting such charges, the balance is returned at end of school year.

$15.00 is the general deposit for all courses, with the exception of the Chemistry, Dyeing and Printing course. The deposit for this latter course is $20.00.

LOCKER DEPOSITS

Students of the Day School also make a deposit of $2 for a locker key, of which amount 50 cents is refunded upon the return of the key, the balance, $1.50, being retained as rental for the use of the locker. Keys will not be redeemed unless presented within thirty days after the close of the current school year.

HOURS OF STUDY—Day Classes

From Monday to Friday, inclusive, all classes are in session from 9 A. M. until 12 noon, and with the exception of the second and third year classes in Warp Preparation and Weaving, they are in session from 1 P. M. until 4 P. M. The afternoon sessions in the second and third year in Warp Preparation and Weaving continue until 5 P. M. The hours of study on Saturday are from 9 A. M. until 12 noon.

The Second Year Regular, Second Year Wool and Worsted, and the Third Year Regular Day Classes are also required to attend the course of lectures on Cloth Finishing

and those on Wool Selecting, Grading, Sorting, Blending, etc., in accordance with announcements made during the year.

DISCIPLINE

The organization and discipline of the School require from all students strict observance of the following: Punctual and regular attendance, polite and orderly conduct, and the return of all tools, materials and apparatus to their proper places before leaving the class rooms. A serious breach of any of the foregoing will be considered sufficient grounds for dismissal without remission of fees. The disposition on the part of any student to enter other class rooms than his own, or to loiter in the hallways or at his work, or to waste his time in any other manner, will be regarded as disorderly. Schedules showing the arrangement of classes and the hours to be given by the instructors to each are posted in conspicuous places. Students must observe these schedules and may not claim the teachers' attention at other hours. No book, chart or other educational appliance, which is the property of the School, will be allowed to leave the building under any circumstances.

EXAMINATIONS

Mid-year examinations are held at the end of January, and the final examinations at the close of the school year, in all branches.

CERTIFICATE—Day School

Certificates are awarded to students who have completed the first two years of the Regular Three Year Textile Day Course, or the first two years of the Regular Three Year Chemistry, Dyeing and Printing Courses, and to students completing any of the following Regular Two Year Day Courses: Cotton—Wool and Worsted—Silk—Yarn Manufacturing—Jacquard Designing—on the following conditions: A degree of "Excellent," "Good" or "Fair" must have been attained for the work of the Course in each branch taught in the respective classes, and the final examination must have been passed in a satisfactory manner.

Note—For evening-class certificate, see page 108.

DIPLOMAS

The Diploma of the School is awarded to students of the Three Year Regular Textile Day Course, and the Three Year Regular Chemistry, Dyeing and Printing Courses, who have obtained the certificate offered for the second year of the course, and who have completed their third year's work in accordance with the conditions outlined under the head of certificates.

NOTE.—No student is eligible for promotion into an advanced class who has not completed the work of the preceding year, including the examinations, in a satisfactory manner.

SCHOOL HONORS—Prizes

The following prizes are offered for competition:

To the (regular) Graduating Class:

THE THEODORE C. SEARCH GOLD MEDAL.

To earn this prize, the student must, in addition to having completed the three years' regular course, and passed his examinations in an eminently satisfactory manner, have undertaken some special research into a matter relating to the textile industry, on the result of which, as expressed by a thesis or some practical result accomplished, or both, the award will be made.

MEDAL OF THE NATIONAL ASSOCIATION OF COTTON MANUFACTURERS.

The National Association of Cotton Manufacturers of Boston offers a medal to be awarded to such member of the graduating class of this School as may be designated by a special committee appointed for this purpose, who will examine the results of the year's work. The award will be based upon the general excellence of the year's work, and will be determined partly by an inspection of the fabrics produced by the student, coupled with the results of Preliminary and Final Examinations, and partly by consultation of the records of the student's diligence and progress during the year as kept by his instructors.

THE HENRY FRIEDBERGER MEMORIAL PRIZE.

Ten dollars will be awarded to the student of the graduating class who ranks second in general excellence.

Associate Committee of Women's Prize.

Ten dollars for best executed work in Jacquard Design. Open to members of third year day class.

The Textile World-Record Prize.

Fifteen dollars to be awarded to the student of the third year day chemistry dyeing and printing class attaining the highest rating for the year's work.

The Textile World-Record Prize.

Ten dollars to be awarded to the third year student of the evening school who attains the highest rating for the full three-year course in chemistry and dyeing.

The Thomas Skelton Harrison Prize.

Ten dollars to be awarded to the third year student of the evening school who attains the highest rating for the full three-year course in chemistry.

To students who have been in attendance at least two years:

The Miss Clyde Prize.

Ten dollars for best executed work in Jacquard Design. Open to members of second year regular day class.

The Joseph Elias Prize.

Ten dollars to be awarded to a member of the second year day Silk Class, producing the best designed and woven Jacquard Silk Fabric.

The John G. Carruth Prize.

Ten dollars to be awarded to the student of the second year day wool class attaining the highest rating for the year's work.

The Krout & Fite Mfg. Co. Prize.

Ten dollars to be awarded to the student of the second year day cotton class attaining the highest rating for the year's work.

The Herbert D. Allman Prize.

Ten dollars for the best practical color scheme for woven stuffs, including rugs and carpetings, to a member of the second year day class.

The Elizabeth C. Roberts Prize.

Ten dollars awarded to the day student producing the best specially designed and woven Jacquard Fabric.

To students who have been in attendance one year:

The Mrs. Joseph F. Sinnot Prize.

Ten dollars awarded to the student of the first year day chemistry and dyeing class attaining the highest rating for the year's work.

The Joseph Elias Prize.

Ten dollars to be awarded to the student of the first year evening Jacquard class attaining the highest rating for the year's work.

The Delta Kappa Phi Fraternity Prize.

Ten dollars to be awarded for the best general work executed on the Harness Loom, by a student of the first year day class.

The Phi Psi Fraternity Prize.

Ten dollars for best executed work in Color Harmony and Design. Open to members of first year day classes.

The Delta Phi Psi Fraternity Prize.

Ten dollars for general excellence in weave formation and fabric analysis. Open to members of first year day classes.

MERIT SCHOLARSHIP

A merit scholarship is awarded to the student attaining the highest rating for the year's work, including the preliminary and final examinations, in the first year Regular Textile Day Course.

Merit scholarships good for the third year of their courses are also awarded to the students attaining the highest rating for the second year's work in the Regular Textile Day Course and the course in Chemistry and Dyeing.

WORK OF STUDENTS

All fabrics woven in the School become the property of the institution. The School also reserves the right to retain one specimen of each student's work in each branch studied.

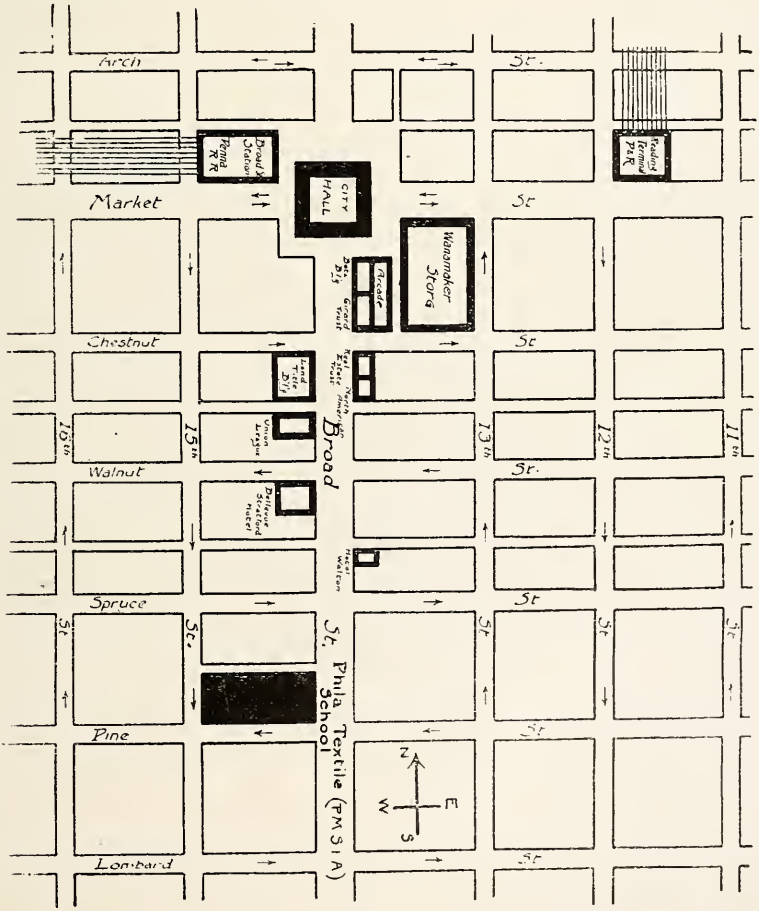
TOOLS AND MATERIALS

The tools required in the Regular Course, Woolen Course and Cotton Course are: A set of drawing instruments, a drawing board, a pair of pliers, a pair of scissors and a reed hook. All books, tools and also materials, such as

designing paper, paints, brushes, drawing boards, drawing instruments, pencils, etc., are for sale in the School at less than retail prices. The expense of these is usually about $20 for the year. All students of the School are expected to provide themselves with a full suit of overalls.

BOARD

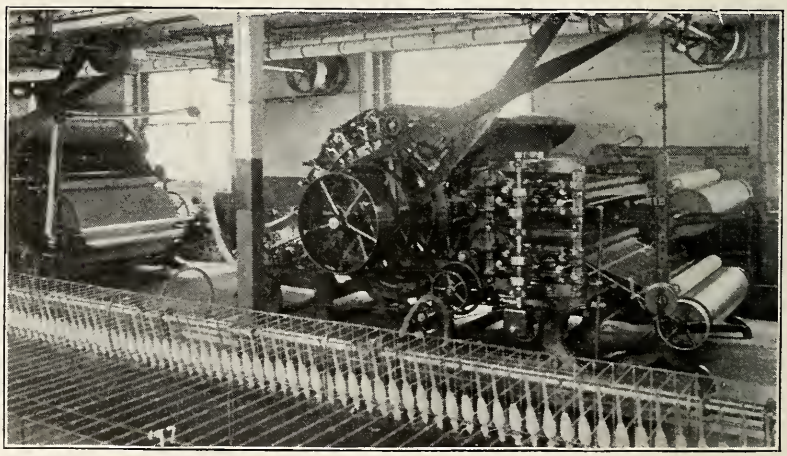
Good board may be obtained in the vicinity of the School for $5.00 a week and upward. A list of desirable boarding houses is kept at the School, and will be furnished on application to the Registrar.



LOCATION OF THE SCHOOL WITH RELATION TO THE CITY HALL, RAILWAY STATIONS, ETC.

Equipment

The School can now lay claim to an equipment excelling that of any similar institution. The numerous machines and appliances have been added from time to time as their necessity became apparent. Wherever it was seen that a new apparatus would assist in the demonstration of a subject, that apparatus was obtained, and where an improvement was made in machinery already in the School, either that improvement was attached or the old machine was replaced by an entirely new one. In this manner, the institution has kept apace with the development of the times, and we feel assured that but a glance at the following will reveal the opportunity for practical instruction which is afforded.



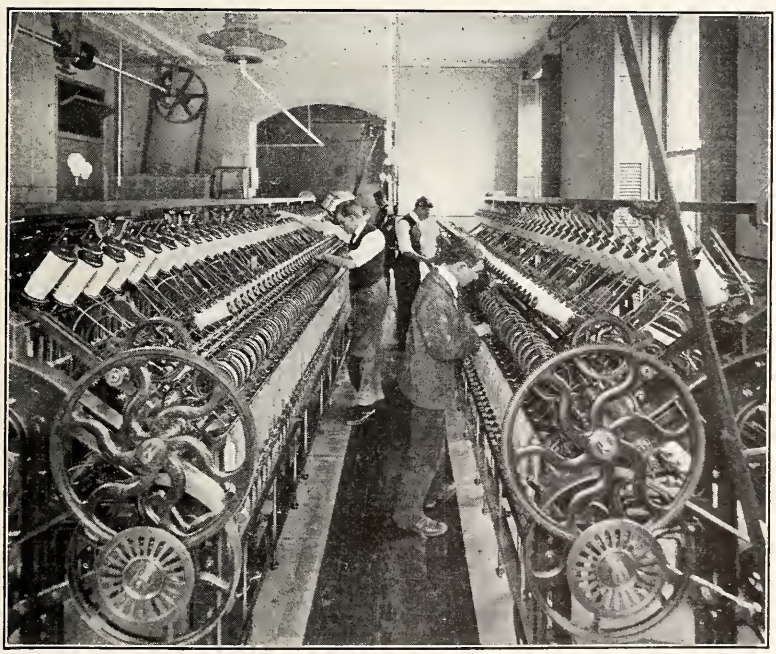
SECTION OF WOOL CARDING AND SPINNING ROOM.

WOOL PREPARING, CARDING AND SPINNING LABORATORIES

The two rooms in which the practical work of woolen yarn manufacture is carried on are most admirably laid out for the purpose intended. One of the rooms is devoted to the dusting, burr extracting and mixing of the wools, which is accomplished by the use of the Wm. Schofield improved willow, the C. C. Sargent's burr picker and the Wm. Schofield mixing picker. The other room is

devoted to carding, spinning, twisting and reeling. The machinery employed consists of two sets of cards, one 48-inch Furbush, and the other 60-inch Gessner, both equipped with the latest-improved feeds of the Apperly and Bramwell make; two small Torrance sampling cards for the making of fancy mixes; a 400-spindle self-acting mule, Platt pattern, Furbush make; floor and traverse grinders, Furbush and Roy make. The finisher card of the Furbush set is equipped with the latest improved 1904 Barker rub motion, to which is attached the latest improved Chapman Electrical Neutralizer. All the clothing in use on the above cards is from the American Card Clothing Co. The finisher card of the Gessner set has what is known as the strap dividing condenser.

A 72-spindle latest improved trap twister, Lowell machine shop make, and a 36-inch combination yarn reel of the Lindsay, Hyde & Co. make. The room in which the preparing machines are installed is thoroughly equipped with the General Fire Extinguisher Co's automatic sprinklers.



SECTION OF WORSTED SPINNING ROOM, SHOWING WORSTED SPINNING FRAMES.

WORSTED DRAWING AND SPINNING LABORATORIES

The four rooms devoted to this branch contain what is practically known as one complete set of English open drawing and

spinning machinery. The set is composed of 12 machines, which are not working models, but are typical of what are found in any well-equipped worsted mill. All of the above machines were made by the Lowell Machine Shop, Lowell, Mass. In addition to the foregoing, the department contains twisting, spooling, reeling and bundling machinery of equally high standard, the makers being Furbush, Easton & Burnham, Lindsay, Hyde & Co. and A. W. Allen, respectively. The rooms are also equipped with a complete humidifying system, installed by the American Moistening Co., Boston, Mass.

COTTON CARDING AND SPINNING LABORATORY

This, the third department mentioned for the manufacture of raw materials into yarns, contains a full line of machinery necessary for the processing of cotton into yarns of varying counts of fineness. All of this machinery was made especially for the school by the following well-known makers, and is up to date in every respect. It consists of revolving flat card, railway head and drawing frames from the Saco & Pettee Machine Works, Newton Upper Falls, Mass.; slubbing and roving frames from the Woonsocket Machine and Press Co., Woonsocket, R. I.; warp and filling spinning frames from the Fales & Jenks Machine Co., Providence, R. I., and Whitin Machine Works, Whitinsville, Mass.; self-acting mule, Platt Bro. make, Oldham, Eng.; spooling, twisting, reeling and band making machinery, from the Easton & Burnham Machine Co. and Fales & Jenks Machine Co., Providence, R. I., and the Draper Co., Hopedale, Mass. The department is fully equipped with humidifiers from the American Moistening Co., Boston, Mass.

KNITTING LABORATORY

This branch is carried on as an adjunct to the yarn-spinning department, and is calculated to fit the student to not only know the practical requirements of plain knitting, but to be more fully competent to judge of the yarn required to produce the knitted article desired.

The installation of machines consists of seven-eighths and full automatic knitters of the latest improved types. The following makes are represented: The "National," from the National Knitting Co., Philadelphia, Pa.; the "Invincible," from the E. Jenckes Mfg. Co., Pawtucket, R. I.; the "Acme," from the Mayo Knitting Machine Co., Franklin Falls, N. H.; the "Standard," full automatic, from Standard Machine Co., Philadelphia, Pa.; the "Banner," full automatic, from Hemphill Manufacturing Co., Pawtucket, R. I.; the Paxton & O'Neill, three-quarter automatic, from Paxton & O'Neill, and Branson, seven-eighth automatic, from Branson Machine Co., Philadelphia, Pa.; "Ribbers," from Branson Machine

Co., and Scott & Williams, Philadelphia, Pa., and McMichael & Wildman, Norristown, Pa.; "Underwear Machine with Crawford Stop Motion," from Scott & Williams, Philadelphia, Pa.; "Loopers," from Hepworth & Co., Philadelphia, Pa., and William Beattie, Cohoes, N. Y.; "Lamb," from Lamb Knitting Machine Manufacturing Co., Chicopee Falls, Mass.; "Cone Winders," from Universal Cone Winding Co., Boston, Mass.

WINDING, SPOOLING, TWISTING, REELING, WARPING, ETC.

For the purpose of proper administration, the various machines devoted to the preparation of cotton, wool and worsted yarns for the loom are grouped in one large room, so that the very best advantage in the way of instruction and practical usefulness may be obtained. The machines in use in this work are recognized among the best to be had. The following makers are represented:

Bobbin winders for cotton, wool and worsted from the Fairmount Machine Works and W. W. Altemus & Son; drum and upright spoolers for cotton, wool and worsted from W. W. Altemus & Son, and Easton & Burnham; ring twisters, for plain and fancy twisted yarns, from Collins Bros., the Draper Co. and the Philadelphia Textile Machine Co.; cop winders for carpet, backing and upholstery yarns from A. W. Allen and W. W. Altemus & Son; yarn reels, six in number, straight, cross, and combination, from the Draper Co. and Lindsay, Hyde & Co. Machines devoted to warping and beaming include, in addition to the numerous pin warping frames and creeds, upright and sectional warpers for cotton, worsted and woolen yarns, and a T. C. Entwistle chain beamer and six specially constructed beaming frames.

SILK REELING, WINDING AND WARPING

Particular attention has been given to the equipment of this department of reeling, winding and the preparation of silk for weaving purpose. The machinery installed includes soft silk skein winders, doublers and Swiss quill-winding machines, warpers and creels, as well as beamers for above warpers. All this machinery is from the Atwood-Morrison Co., Stonington, Conn. Additional quill-winding machinery is from the Schaum & Uhlinger Co., Philadelphia, Pa., and two reels for winding direct from the cocoon. The silk department also possesses the entire collection of the Women's Silk Culture Association of America, which in itself is a most valuable aid to those making a study of the silk fibre.

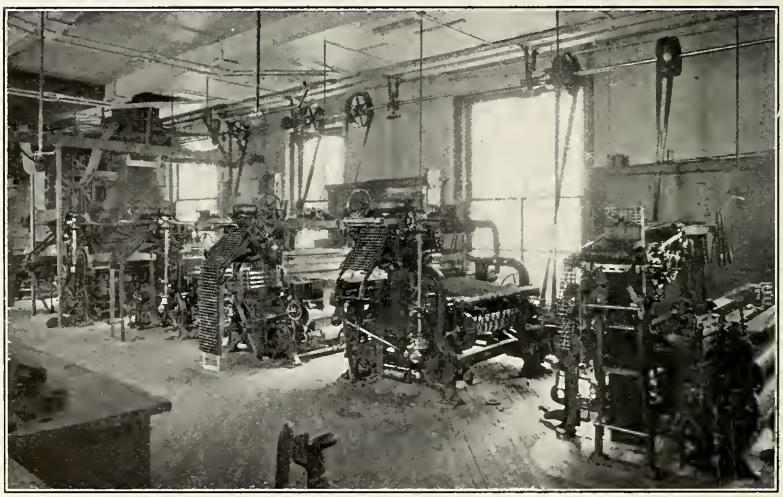
HAND-WEAVING LABORATORY

The rooms devoted to hand weaving and related branches are three in number. These rooms contain upwards of 90 looms,

specially designed and constructed, adaptable to the weaving of all classes of textures. Groups or sections of looms are formed, each section being devoted to some special class of goods, such as cotton or union fabrics, wool and worsted fabrics for both men's wear and women's wear. Jacquard and special stuffs in cotton, wool and worsted, as well as those for plain and fancy silks, furniture coverings and draperies. Several looms are devoted to such narrow fabrics as laces, bindings, ribbons and elastic and non-elastic webbings.

POWER-WEAVING LABORATORY

The four laboratories in which the equipment for power weaving is installed are arranged so as to admit of satisfactory administration in accordance with the organized courses of instruction. The com-



HEAVY WORSTED AND WOOLEN LOOMS.

pleteness and variety of this equipment is unexcelled by that of any similar institution. The machinery is of American make, from the best makers, thoroughly up to date and exceptionally well assorted. The breadth of the school's field of instruction necessitates this extensive collection of machinery, the policy being to teach by means of that which is best adapted to the fabric in question, and when a loom builder brings out an improvement, the new is substituted for the old or new attachments added.

The looms in most frequent use by the classes are located in a large, well-lighted room, and the purposes for which they are intended range from the finest gingham to the heaviest worsted and woolen of the harness type, including various looms with leno

attachments. The production of fabrics of a more highly ornamental character, including the finest silk damask, dress goods, draperies and heavy woolen robes, is provided for by a large collection of suitable looms equipped with Jacquard machines. Three other laboratories, not as large as the one mentioned, are fitted up on the same general plan, and contain looms for special purposes, but which are not apt to be in as common use. The ingrain carpet industry is cared for by three typical looms of different makes, and included in the equipment for fine cottons are three filling magazine looms with warp stop motions, showing that the school is keeping apace with progress in this line. The narrow goods, elastic and non-elastic, are amply provided for, as well as fabrics to which the swivel and lappet principles are applied, also terry or Turkish toweling.

The following well-known makers of looms are characteristically represented in the school's power-weaving plant:

The Crompton & Knowles Loom Works, Worcester, Mass., from which shops the school has obtained a large proportion of the looms for silks, cottons, worsteds, woolens, upholstery fabrics, carpets, towels, lappets, lenos, etc.

From the Draper Co., Hopedale, Mass., three automatic looms for plain and fancy cottons.

From Schaum & Uhlinger, Philadelphia, Pa., looms for silks, swivel dress goods, draperies, ribbons, narrow webbings, etc.

The looms from the following makers are intended for fine cotton fabrics: The Whitin Machine Works, Whitinsville, Mass.; the George W. Stafford Co., Readville, Mass.

JACQUARD CARD CUTTING AND LACING LABORATORY

The large number of Jacquard machines possessed by the school (26 in number, ranging from 200 to 1,200-hook capacity) has necessitated a proportionately large number of card-cutting machines to facilitate the work of Jacquard design. Very few factories possess the facilities for card stamping which may be found in this department.

The room in which these machines are contained is exceptionally well lighted, having both top and side lights, and is equally well provided in other essential features. The equipment consists of the following machines:

One American and one French index, foot power, card stampers, from Schaum & Uhlinger, Philadelphia, Pa.

Four latest improved French index, foot power, card stampers, from John Royle & Sons, Paterson, N. J.

Two latest improved, one 1904 and one 1907, power French index card stampers, from John Royle & Sons, Paterson, N. J.

The American index machine is intended for ingrain carpet

work alone. Each of the others is adjustable to 200, 400, and 600 cards, and is also equipped with the latest improvements in the way of racks, escapements, reading boards and other features indispensable to the production of good work.

The department also possesses several sets of punching plates for side Jacquards, a power card-lacing machine for 200, 400, 600 and ingrain cards, as well as several hand card-lacing frames. Also braiding machines from New England Butt Co., for the manufacture of lacing cord used.

CHEMICAL LABORATORIES

The three rooms devoted to practical work in pure and applied chemistry are admirably equipped with all necessary glass, porcelain and platinum ware, etc.

Besides his individual outfit, the student has the use of such forms of special apparatus as his work may require.

DYEING LABORATORY

A large number of bench lockers provided, with necessary apparatus for experimental dyeing and dyestuff testing.

A number of copper and woolen dye vats for dyeing yarn and piece goods in lots of 1½ pounds up to 50 pounds.

Scouring tubs, soap boiler, scouring and dyeing bowls for loose stock.

Klauder & Weldon scouring and dyeing machine for yarns of all characters; also Klauder & Weldon machine for dyeing of loose stock; Granger jig-dyeing machine; Butterworth warp-dyeing machine; Psarski model dyeing machine with pump complete; Schaum & Uhlinger hydro-extractor; one Mulhausen laboratory printing machine, and one Mather & Platt laboratory printing machine; steaming cottage; hot-air dryer. All the water used in the dye house is clarified by the aid of a large filter, installed by the Philadelphia Water Purification Co.

One Allen circulating Kier for boiling-out, under pressure, cotton and other vegetable fibres in the form of yarn or piece-goods.

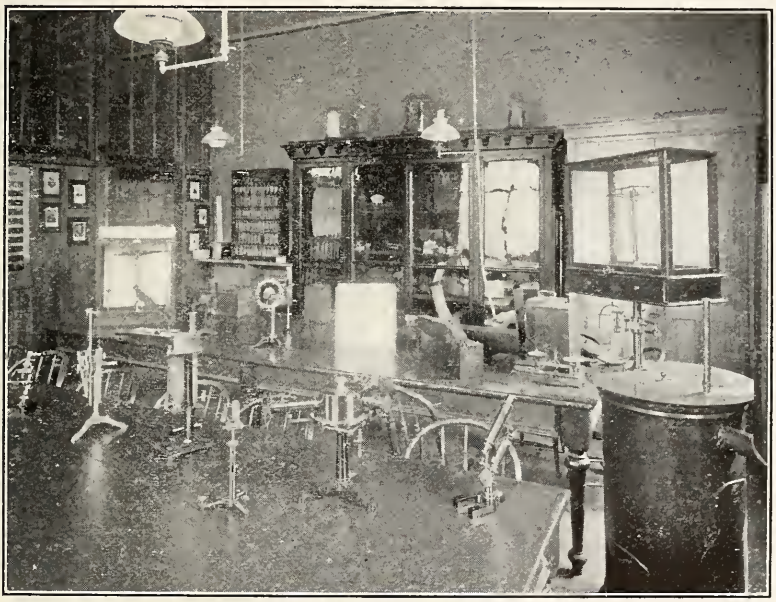
An experimental slate bleaching tank from Penrhyn Slate Co., and an apparatus for bleaching with sodium peroxide from Roessler, Hasslacher Co., are used to show the latest developments in bleaching.

MICROSCOPIC FIBRE-TESTING AND COLORIMETRIC LABORATORY

This is well equipped with a number of microscopes and apparatus for the preparation of slides and sections; photographic apparatus for the making of photomicrographs; Lovibund tinto-

meter, with set of standard glasses and large number of gelatine films of various dyestuffs; a Zeiss comparison spectroscope and a Zeiss universal spectroscope, with all accessories for the spectroscopic study of dyestuffs; a Reeser & Mackenzie fibre-testing machine, for determining tensile strength and elasticity.

The laboratory is also supplied with a conditioning oven of the latest pattern, capable of rapidly and accurately giving the amount of hygroscopic moisture contained in any class of fibre in any form, raw or manufactured. Tests on small or large samples can be made with equal facility.



MICROSCOPIC AND COLORIMETRIC LABORATORY.

CLOTH FINISHING LABORATORY

The facilities for finishing of the various fabrics produced in the school are quite in keeping with those of other departments, and consist of one three-quarter combination washing and rotary fulling mill, and one small fulling mill for samples, both from the James Hunter Machine Co., North Adams, Mass.; a Gessner improved push mill, with lateral side movement; single-cylinder upright gig, Curtis & Marble make; Parks & Woolson cloth shear, with patent listing motion; Parks & Woolson double-cylinder cloth brush, with steamer attachment; Gessner improved cloth press; Morris & Tasker hydro-extractor, tenter bars, frames, etc.

Courses of Study—Day School

The School offers to prospective day students the following carefully prepared courses of instruction, each of which has been organized with a distinct purpose. The broad subject of textile manufacture receives a most comprehensive treatment in what is termed the:—

REGULAR TEXTILE COURSE (Diploma)

This course, which is the development of twenty-four years of active, thoughtful work in textile education, is

ONE OF THE LECTURE ROOMS.
This is a well-lighted room and is especially intended for work in analysis of fabric, weave formation, color harmony and similar studies.

strongly recommended to all, particularly on account of its scope; tending, as it does, to overcome for the individual the narrowness of knowledge which is apt to result from division of labor and specialization in industry. The keen competition of the present day has placed a premium on the man whose knowledge is broad, and it is in realization of this fact that the Regular Course has been arranged to give full instruction in cotton, wool, worsted and silk yarns and

fabrics. The person following this course is enabled, on its completion, to enter any of the mentioned branches of the industry, and by his knowledge of the others recognize good features in them and adapt these good features to his own fabrics. Three years are required to complete this course, which includes the following:—

Subjects of Study—First Year

WEAVE FORMATION

This subject treats of the construction of the various classes of weaves which govern the manner in which threads are interlaced to form woven fabrics. In this, the first year, the subject is considered in its relation to fundamental and derivative weaves for fabrics, composed of one warp and one filling, up to and including fabrics composed of two warps and one filling, and inasmuch as their use is confined to no one material their study is common to the silk, cotton, wool and worsted courses. The weaves are studied in their relation to one another, together with their peculiarities of texture, take-up, effect, feel and color possibilities. At the close of the year the student possesses an extensive record of his work, which is continued in the succeeding years of the course. The following gives a general idea of the scope of this year's instruction:

General principles of the structure weaves.—Explanation of "Warp" and "Filling."—Methods of representing weaves on squared paper.—Classification of weaves.—Foundation and derivative weaves.—Plain weave and the methods of ornamenting it.—Methods for constructing the various twill and satin weaves.—Influence of the twist of yarn on the effect of the weave.—Explanation of drafting.—Rules for preparing drawing-in drafts and chain drafts from weaves.—Reducing weaves to their lowest number of harnesses.—Various weaves derived from the "Foundation Weaves."—Methods for their construction.—The various fabrics to which they are adapted.—Circumstances which make it more advantageous to use one class of weaves than another.—Weaves which are suitable for particular classes of fabrics in contrast with weaves for other classes.—Weave combination.—Consideration of "Texture" and "Take-up" in placing weaves together.—Combining weaves to form stripes and checks.—Effect of color on the weave.—One-and-one and two-and-two systems.—Two-and-two and four-and-four applied to fancy weaves.—An extra filling added to weaves.—Figured effects produced by floating the extra filling on the face.—Figures produced by so stitching the extra filling as to produce light and dim effects.—Single-faced and double-faced fabrics produced by using an extra filling.—Extra filling for adding weight to a fabric.—The addition of an extra warp.—Single and double-faced fabrics produced by using an extra warp.—The use of an extra warp for figuring on the face.—Increasing the weight by the use of an extra warp.—Proper methods for stitching the back to the face.—Effect of improper stitching.—Imperfect cloth resulting from the same.

ANALYSIS AND STRUCTURE OF FABRICS

Cotton, wool, worsted, silk and other varieties of yarns and fabrics are carefully investigated and discussed with a view to the formation of desired fabrics. A brief outline of the plan of work is here appended.

YARN CALCULATIONS—Grading yarns with regard to size.—Consideration of the various systems in their relation to one another in one or more ply threads. The relation of count, weight and length of different threads.

FABRIC ANALYSIS.—Ascertaining the weave, drawing-in draft, chain draft, ends and picks per inch, arrangement of warp and filling

FABRIC EXAMINING AND TESTING LABORATORY.

colors, counts of warp and filling, take-up in weaving.—Amount of each color and material required in a given length of goods.

FABRIC STRUCTURE.—Is studied in part by observation and deductions based on the results obtained in the thorough analysis of fabrics which may be remarkable for their good or bad qualities. This subject also includes the organization of specifications, designs and colorings for prescribed fabrics, the majority of which are executed by the student, thus enabling him to see the actual result of his thought.

HAND WARPING AND WEAVING ROOM.
All operations of Warping and Elementary Weaving are here performed by the students.

FREE-HAND DRAWING

Looking at a thing does not necessarily indicate seeing a thing. Free-hand drawing taxes the former to insure the latter. So much from a practical standpoint. Furthermore, free-hand drawing cultivates a better taste, which is an essential in all embellishments, and thus becomes a necessity for the appreciation and acquirement of the subsequent studies of figured design, color harmony, etc.

FIGURED DESIGN

Designing does not simply indicate an indiscriminate decoration, but the exercise of care in the appropriateness of embellishments, whether such be used for the highest flowery design of a carpet or the simple lines of trouserings or shirtings. In textiles this becomes more apparent when we consider not only the decorations and uses, but likewise the markets for which they are intended; hence special attention is paid to original drawings of natural forms, their conventionalization, history of ornament, and theory of color.

COLOR HARMONY

This subject is one of vital importance to all concerned in the manufacture and marketing of textiles, for, in spite of good design and good fabric, if the coloring is not pleasing the fabric will not sell. A thorough study of this subject, relating entirely to textiles, is a prominent feature of the school's work. While the principles of color are the same, whatever their application, the course of study is so arranged as to bear entirely on yarns and fabrics. Starting out with the raw pigment, and working on paper and in the actual goods, the eye of the student undergoes a gradual and almost unconscious training in the application of what is good and what is bad in color combination. He becomes able to decide not only what colors or shades may be tastefully combined, but also on the relative depths of tone which will be allowable under given conditions and in given combinations. His knowledge of the structure of fabrics and of design enables him to estimate correctly the quantity and quality of the color which will be visible on the face of the goods, and to make correct allowances in his original color scheme for the modifications of effect which these conditions imply.

WARP PREPARATION AND WEAVING

This subject is taught as a means of demonstrating and developing the instruction given in weave formation and fabric structure, and, while keeping this idea in view, due attention is also paid to the giving of a thorough grounding in the underlying principles of weaving and weaving mechanism. Experience has proven that these ends are most rapidly attained by means of the hand loom, and for this

reason each student has the use of such a loom of especial construction, with a capacity of 30 harness, 4 x 4 boxes. By means of this loom he produces fabrics, studies the relation of weave, yarn, texture, take-up and cover, together with the proper conditions of warp line, tension, height of shed, throw of shuttle, beat of lay, etc., all of which are under his personal control. In addition to this, all students will be required to devote a certain amount of time to power-loom practice, contingent, however, on progress in the foregoing. In general, the work is as follows:

Analysis and explanation of the hand loom.—Various methods of forming the "shed."—Lambs, treadles and countermarch.—Dobbies and witches.—Calculations as to texture and ends in warp, width in reed, etc.—Arranging the threads to form the warp.—Beaming, entering.—Drawing-in, twisting-in and reeding.—Adjusting the warp in the loom.—Pattern chain building.—Weaving on the hand loom of a prescribed number of fabrics of cotton, wool, worsted, and silk.

JACQUARD DESIGN

The aim of this study is to adapt the principles taught under the subject of weave formation to the capabilities of the Jacquard machine.

The Machine.—The general explanation of the simpler forms of the machine is followed by the making of drawings of the internal working parts, showing their relation and connection. Comparisons are duly made between the harness shedding motion and the Jacquard.

Mounting.—The French and English systems of mounting or tying-up are thoroughly explained. Combinations of the various orders of these systems are made in actual practice, as well as calculations for the laying out of textures in the comberboard.

Designing.—The making of sketches for various textures and tie-ups.—The use of squared design paper.—Principles of enlarging sketches.

Card Stamping.—The principles of card stamping and lacing.—Fingering for French, American and fine index stamping machines.—Card-stamping directions.

CHEMISTRY

For outline of work in this subject, see Chemistry I, page 85.

TEXTILE FIBRES

For outline of work in this subject, see Dyeing I, page 89.

COTTON YARN MANUFACTURE

The chief advantage of school training in this subject does not lie in the actual operation of machines, but rather in the knowledge of how to adjust the parts of the machines to suit varying conditions

COTTON CARDING, DRAWING, SPINNING AND TWISTING LABORATORY.

necessitated by different lengths of fibre and counts of yarn, in order that the machines may be run to the best advantage. The use and structure of each portion of the machines is studied in its relation to the other parts with reference to its effect on the product. Starting with the desire to produce a certain yarn, all the necessary calculations of speed and delivery are made, so that the proper amount of work may be done at each operation and the fibre handled with the least amount of injury and waste. The knowledge of how to blend fibres and produce yarns makes the person who is also familiar with designing and weaving exceptionally valuable, either as designer, as overseer of weaving or of carding and spinning, or in those positions in which men are expected to superintend all three of these operations. The following is an outline of the scope of the subject:

Varieties of Cotton.—Their characteristics and uses.—The adaptation of various cottons to different classes of work.

Preparatory Processes.—Bale breakers.—Mixing lattices.—Openers.—Intermediate and finisher pickers.

Carding.—The theory of carding carefully studied.—Brief outline of the various methods of carding, with a thorough study of the construction and working of revolving flat cards.—The necessary settings and adjustments, together with calculations for all changes in the speeds of the different parts.

Card Clothing.—The essentials of good carding.—The principles of grinding and the practical accomplishments thereof.

Combing.—The process briefly outlined, showing its use and place in the order of operations. Considered fully in the second year.

Railway Head.—Its functions and advantages.—Calculations for necessary changes.

Drawing.—The object of drawing.—Functions of the drawing frame.—Different types of frames in use.—Rules for all changes.

Fly Frames.—Slubbers.—Intermediates.—Fine roving frames.—Their functions, similarities and differences.—The theory of winding.—Differential motions of Holdsworth, Tweedale, Daly, and others.—Rules and calculations for changes.

Spinning.—The theory of spinning.—The mule and ring frame.—Spindles, travelers, rings, builder motions.—Calculations for draft and twist, and production.

Note.—The course is conducted by means of lectures, recitations, quizzes, essays, abstracts and practical work upon the machines. Winchester's "Theory and Practice of Cotton Yarn Manufacturing" is used as a text-book.

Subjects of Study—Second Year

WEAVE FORMATION

The instruction in this subject given in the second year may be said to embrace an application to heavier and more complicated fabrics of the weaves studied in the first year. The work in general

is confined to double weaving—that is, weaves for fabrics composed of two systems of warp and of filling—and its treatment is general in its application, including fabrics of silk, cotton, wool, and worsted. The following is a brief statement of the matter covered:

Value of a knowledge of double cloth weaves.—Methods of constructing double cloth weaves, and of indicating them on designing paper.—Consideration of the various proportions of face and back, such as one face and one back, two face and one back; three face and one back.—Also those on which the warp and filling have not the same arrangement, such as one face and one back in warp, and two face one back in filling; two face one back in warp, and one face one back in filling and other irregular arrangements.—Rules for stitching double cloth weaves.—Invisible stitching.—The production of figures by means of the three-color striped weaves.—Double plain weaves for reversible figured effects.—Weaves for such special fabrics as Bedford cords, dotted Swisses, plaid lawns, pique, figured pique, Marseilles, coatings, matellasses, face-finished fabrics, beavers, kerseys, meltons, tricots, chinchillas, etc.—Longitudinal and diagonal-rib.

ANALYSIS AND STRUCTURE OF FABRICS

Cotton, wool, worsted, silk and other varieties of yarns and fabrics are considered on somewhat the same plan as in the first year, but by means of more advanced problems.

Yarn Calculations embrace a study of the shrinkages which are encountered in the various operations of weaving and finishing, in their effect on the resulting fabrics.—The selection of proper yarns for required weights of goods and for given textures.

Fabric Analysis is followed largely in double cloths, and, in addition to the points looked for in the first-year analysis, the student is brought in contact with the question of two or more warps and fillings in the one piece. He thus includes in his research the question of different shrinkage and losses, and in his estimate the quantity of materials necessary for a given finished piece of goods.

Fabric Structure.—In planning and calculating on the necessary specifications for the correct structure of fabrics, in this the second year of the course, the student not only steps from single to double cloths, with the consequent augmentation of details, but he is also brought to a consideration of the subject of texture. He is required to decide upon the proper number of warp and filling threads for the weave to be used, and to make all necessary allowances for ease in weaving and for shrinkages after being woven. Hence, a careful study of the question of volume or size of threads is essential, particularly in relation to the interlacings of the different weaves. The actual production of the fabric in all its details by the effort of the student lends much to the value of the theoretical knowledge gained.

JACQUARD DESIGN AND COLOR

The purpose of the consideration of this subject, in addition to adapting the principles of weave formation to the machine, is to expand into broader and more varied effects the work of the first year. Color, being such an adjunct in the making of figured effects, is here applied to assist in bringing out the designs.

THE MACHINE.—The use of various machines, to attain speed and easier action on the warp, are explained, and drawings of the construction of their internal parts made. Such machines are treated as follows:

Rise and fall—Double lift, double and single cylinder—Auxiliary cylinder and twilling machines.—Substitution of trap-boards and tail-cords for hooks and griffe bars.—Substitution of journals for comberboard.

MOUNTING.—The various tie-ups for the working of two warps and extra figure warps are explained, comberboards threaded and calculations made for all necessary particulars for the placing of such forms in the loom as—

Section ties.—Repeated effects in one repeat.—Combinations of straight and point ties for table covers and curtains, etc.—Placing of extra sections in front for striped effects.

DESIGNING.—Cloth-size sketches, in the colors to be used in the woven fabric, are made, and enlarged upon squared design paper, in order that the various applications of weave to produce effects can be studied in a practical form. Designs are worked out in this manner for different textures and tie-ups for—

Cotton and silk derbies.—Reversible draperies.—Blankets.—Figured dress goods.—Fine, super-fine and extra super-ingrain carpets, and various double cloths.

CARD CUTTING.—Card stamping is done from designs made by the students for the various fabrics, in accordance with principles laid down in the first year's work. Students are required to cut and lace cards from their own designs, using both French and American index cutters.

WOOL AND WORSTED YARN MANUFACTURE

In this year, the second of the course, the student studies the subject of "wool" and its manipulation into yarns, largely on the same general lines as that laid down for cotton yarn manufacture, outlined in the first year of the course. Particular attention is paid to the study of what is commercially called the "raw materials" (the wool fibre and the by-products of wool) and the mechanical functions of the various machines used in processing the material prior to spinning. The following is an outline of the scope of the subject:

WOOL SELECTING AND GRADING

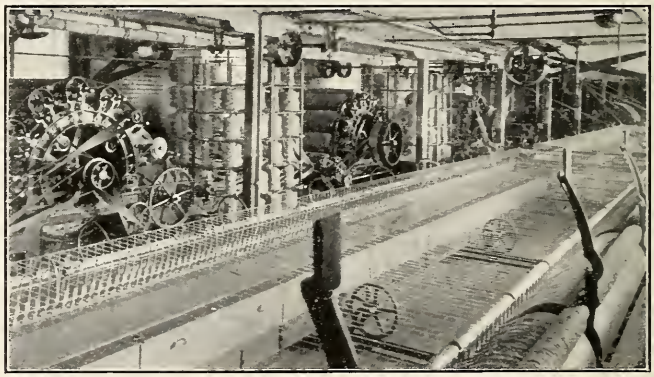
The wool fibre.—Distinction between wool and hair.—Growth.—Nature.—Elasticity.—Trueness of breeding.—Strength.—Softness.—Fineness and length.—Color.—Felting properties.—Wools of different countries.—Comparison of various American wools.—Cashmere.—Alpaca.—Mohair.—Points to be looked for when purchasing wool.—Explanation of the term "Fleece Wool."—Grading of the fleece.

Note.—Wool scouring and drying considered under Chemistry and Dyeing.

WOOLEN YARNS

Preparatory Processes.—Burring and picking.—Consideration of the various burring and picking machines in general use.—Preparation of mixes and methods adopted in laying down mixes according to desired percentages.—Oiling the mix.—Testing and selection of oils.

Carding.—Theory of carding.—Explanation of the term "set of cards."—Names and uses of the various rolls and cylinders.—Truing up of cylinders.—



WOOL CARDING AND SPINNING.

The necessary settings and adjustments, together with calculations for changes in the speeds of the different parts.

Card Clothing.—The essentials of good clothing.—Construction, classification, and uses.—Methods of clothing the various rolls and cylinders.—The principles of grinding and the practical accomplishments thereof.—Frame, Traverse and roll grinders.

Feeds.—Hand, ball, creel, and automatic feeds carefully considered.—The construction and adjustments necessary for the satisfactory operation of the Bramwell, Apperly, Scotch, Tindel, Fisher, etc.

Condensers.—The various forms of condensers in general use.—Ring system.—Single and double doffers.—Bolette single doffer.—Steel blade dividers.—German single doffer strap dividers.

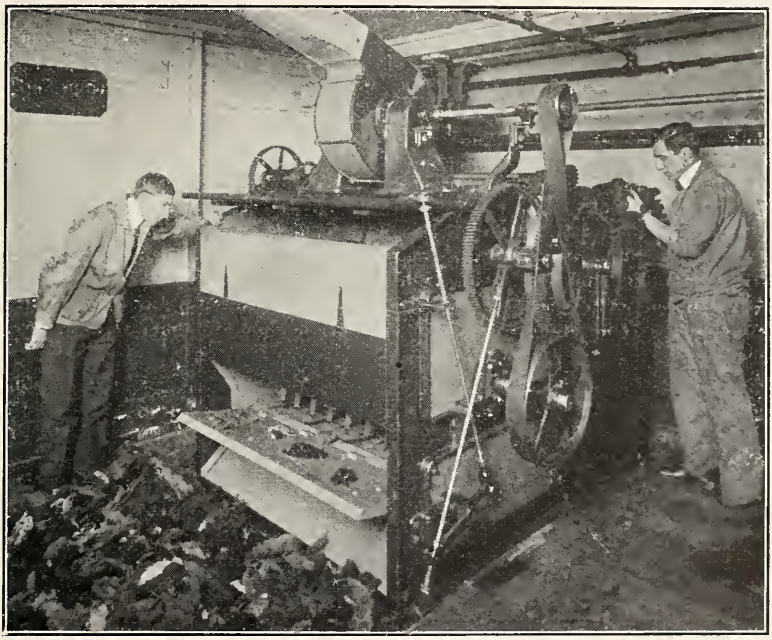
Rubbing Motions.—Rolls.—Aprons.—Aprons and rolls combined.—Single, double and quadruple bank apron rubbers thoroughly studied, together with the methods and appliances used in the making of the various woolen novelty yarns.

In addition to the above a limited amount of machine sketching

and drawing is required, so that by thus supplementing the lectures and practical work in carding and spinning of wool, and the drawing and spinning of worsted, the student is enabled to obtain an acquaintanceship with the various machines, which should be most thorough.

WORSTED YARNS

PREPARING.—Explanation of the process.—Gill box and Faller motion.—What wools are prepared and why they are not carded.—Preparing medium staple wools before carding.



SECTION OF WOOL MIXING ROOM, SHOWING THE SCHOFIELD WILLOW.

CARDING.—Comparison of the card used for worsted with that commonly used for wool.

COMBING.—Original method of combing.—Hand combing.—Combing by machines.—The Noble, Lister, Holden and Little & Eastwood machines duly considered.

BALLING OR TOP MAKING.—Explanation of the workings of the necessary machines used in forming the top.—The Can Finisher and Balling Finisher.—The conditioning of tops.

DRAWING.—The principles of drawing duly explained.

CALCULATIONS.—All the necessary calculations required in the above processes.

Note.—The work in this subject from the fleece to the top is largely elementary; studied more exhaustively in following year.

WARP PREPARATION AND WEAVING

The instruction in this subject in the second year is given with reference to power looms of the latest types. The student now studies the mechanical means which are in vogue for the attainment of the operations of weaving, and which were performed by hand in the preceding year. Careful attention is given to the timing, setting and general adjusting of the various parts of the power looms. The student is required to keep careful records of all such instruction, and to produce a prescribed number and variety of fabrics, of commercial proportions, from his own specifications.

The study of the power loom.—The principles governing its parts.—The various shedding mechanism, cam motion, cam and scroll motion, dobby motion. —Open and closed shed looms and the advantages of each.—The various picking motions, the alternating pick, the pick and pick, cam and cone, sliding pick motion.—Rules and calculations for change gears for the various take-up motions.—Ascertaining desired speed of shafting and size of pulley for given speed of loom.—Shuttle box motions, raise and drop box, skip box, circular box, boxes controlled by cams, by a chain and by the Jacquard.—Timing and setting of the box motions of the Knowles, Crompton, Wood, Furbush, Schaum & Uhlinger, Stafford and Whitin looms.—Knock-off motions.—Fast and loose reeds.—Harness and box chain building and care of stock.—Mutiplier box chain building.—Production of fabrics for men's and women's wear, draperies, carpets, etc., from cotton, wool, worsted, silk and linen, on the latest and best looms made.

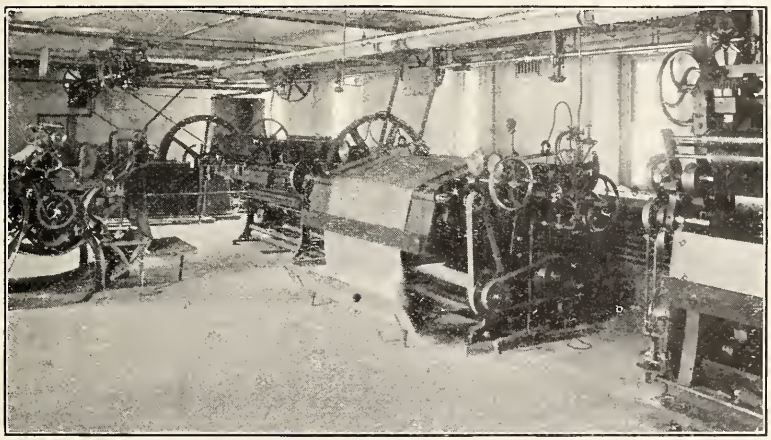
Note.—The fabrics produced by each student are from his own designs and from yarn dyed by the student. He performs all the operations of warping, beaming, drawing-in, reeding, placing in the loom, chain building and weaving, and assists in the finishing of the fabrics.

CHEMISTRY

The chemistry taken up in this year is included under the general title of qualitative analysis, wherein the analytical classification and tests for the various metals and non-metals is studied. The work in this branch, however, is brought right down to a practical basis by employing as objects of the tests the different chemicals actually employed in mill work. These include the various acids, alkalies and salts normally occurring in trade. In this manner it is endeavored not only to give the student a drill in the theory of qualitative analysis, but also to provide him with a concrete basis for his knowledge, so that the ends of both scientific instruction as well as practical information and experience are attained. A good drill in the solving of reactions and the calculation of results is also given, together with considerable laboratory practice in experimental manipulation and the handling and use of analytical apparatus. The whole object of the course is to give the student an intelligent idea of the manner of procedure to be followed in the practical testing and detection of impurities in the various chemicals likely to be employed in the textile industries.

DYEING

Dyeing is also taken up during this year. The course is elementary in character, and is so designed as to embrace the general methods of scouring, bleaching and dyeing both wool and cotton. Its purpose is to give the general textile student an intelligent idea of how these processes are conducted, and the principles on which they are based. The chemical and physical properties of the fibres are studied with a view to their behavior under the different processes of manufacture. The application of the different classes of dyes is taken up, with methods of testing their fastness and suitability for special purposes. The student also has the opportunity of doing practical work in the dye house under careful supervision, and to become acquainted with the modern methods and machinery of dyeing.



DRY FINISHING.

In this room the second and third year students aid in finishing the various fabrics produced.

FINISHING

This highly important step in the production of a marketable textile fabric constitutes a subject which is remarkable for its complexity. The immense variety of goods whose points of difference are dependent wholly upon the character of the finish which has been put upon them calls for the use of numerous finishing materials, and the application of these in their turn necessitates many different machines. The subject is treated in its broader sense by means of lectures throughout the season. The general underlying principles of the art are, however, exemplified by the actual finishing of many of the fabrics produced in the school, and

the students have the opportunity of assisting in the incidental operations, as well as in the mixing of the necessary ingredients. The following gives a general outline of the scope of the lectures:

WORSTED AND WOOLENS

Process of finishing defined.—The preparatory processes of finishing, such as burling, mending, inspecting and numbering.

Scouring.—Scouring, and the various soaps and alkalies generally used.—Action and strength of soaps for the different kinds of cloth.—How the soap and alkalies should be applied.

Fulling.—The fulling process.—Why fulling is resorted to.—The properties of a good fulling soap.—The various influences which most affect the fulling of fabrics, such as the "character" of the "fibre."—The "twist" of the "yarns."—The "nature" of the "weave."—The "weight" of the "goods," light or heavy.

Gigging.—Explanation of the term gigging.—The various machines and methods considered.—Dry and wet gigging defined.

Steaming.—Steaming and crabbing and necessity for such treatment.—Lustre cloths.

Shearing.—Shearing; its purpose.—The effects of previous treatment as to good shearing.—The proper adjustment of machine to shear the various kinds of cloths.—Grinding.

Pressing.—Pressing; rotary and plate pressers considered.—Proper heat and pressure.—Style of finish considered.

Regular Course—Third Year

WEAVE FORMATION

In this, the final year of study, the one which represents the last opportunity the student will have for school work, particular attention is paid not only to weaves of a higher order, of more intricate interlacing, but to a more technical consideration, from a commercial standpoint, of weaves for the every-day fabrics. The solution of the many difficult problems in inter-weaving brought forward in this year throws a new, a clearer light on the preceding year's weaves, giving the student a far better grasp of the entire subject. In other words, he is enabled to investigate problems in a thorough manner and with the satisfaction which comes of knowing how. Three and more ply weaves are planned upon paper, both for plain and figured effects, in such fabrics as overcoatings, cloakings, heavy draperies, brocades, etc.

Study is directed in the line of such woolen and worsted fabrics as crepons, mantle cloths, habit cloths, buckskins, doeskins, carriage cloths, box coatings, casket cloth, friezes, whipcords, coverts, etc., and in all the weaves considered due emphasis is laid upon the effects which they produce when treated with various systems of coloring. Careful and extensive attention is given to leno

or doupe weaves, single and double doupe, combination of doupe and other orders of weaving and the production of figured effects by means of one doupe. Lappet and swivel effects are considered. Weaves are studied which are best suited to such narrow fabrics as suspender and garter webs, goring, name webs, shoe pulls, etc. Filling and warp pile weaves are taken for velvet, corduroys, plushes, imitation furs, astrakhans, chinchillas, lamb skins, etc. Considerable attention is also given to the study of new methods for the derivation of original ground weaves of a granite and crepe order, such as are always in demand for suitings, dress goods, etc.

ANALYSIS AND STRUCTURE OF FABRICS

The fabrics considered are in keeping with the instruction in weave formation, and are not only looked at from the standpoint of their intricacy, but they, as well as simple fabrics, are studied with more of a view to the commercial end than in either of the preceding years. A considerable portion of the work in this branch of study consists of planning the specifications for various classes of fabrics from original designs, and in many cases from yarns which the student has produced from the raw stock. These fabrics are subsequently produced by the student, he having the opportunity of performing every detail, and is ever reminded of the necessity of producing a good and pleasing fabric as economically as possible.

COST FINDING, ETC.

Various systems of cost finding, mill book-keeping, etc., are explained, as well as the questions of commissions, datings, discounts, etc. Thus the student is taught to keep the thought of relative cost well in mind.

JACQUARD DESIGN AND COLOR

In this subject the means is offered the student to carry to an advanced state the work of the previous years, and adapting the Jacquard to all kinds of fancy complicated fabrics, especially in the direction of placing figures in three-ply or more complex fabrics.

The Machine.—The various kinds of Jacquard used in making special fabrics of complex nature are explained and drawings made, showing the variation from the standard machine.

Application of gauze machines carrying doupes and slackeners.—Brussels carpet machines.—Wilton carpet machine.

Mounting.—The student is here made familiar with the actual practice of mounting machines and tying up of the loom for all kind of fancy and complex effects. The combination of the Jacquard and the dobby for producing large repeats in the cloth are explained, and drawings made of the various arrangements of the principal parts. Mountings are prepared for—

Gauze and leno effects.—Scale tie-ups.—Shaft lashing.—Placing of shafts

in neck cords.—Placing of shafts below comberboard.—Compound harness.—Attaching of harness for ground effects, etc.—Brussels mountings.—Moquette carpet mountings.—Pile carpet mountings.

Designing.—The influence of color on the appearance of a design is fully recognized, and especial attention is given to the making of sketches in color for carpets and upholstery fabrics. Original designs are planned and enlarged to workable designs for—

Silk brocades of two more fillings and warps.—Traveling robes.—Bath robes.—Tapestries.—Petit point.—Couch covers.—Shoe pulls.—Coat labels.—Necktie fabrics.—Brussels, Wilton, moquette and tapestry carpets.

Card Cutting.—Following the practice in card cutting obtained in the previous year's work, card-cutting directions are made for all kinds of effects, and cards are cut for original design made during the year. Methods of repeating cards by mechanical means and the workings of new automatic card-cutting appliances are explained, and sketches made of their working parts.

YARN MANUFACTURE

In this subject the student may elect to take advanced study in either the manufacture of wool and worsted yarns, as outlined on page 68, or cotton yarn, as outlined on page 65.

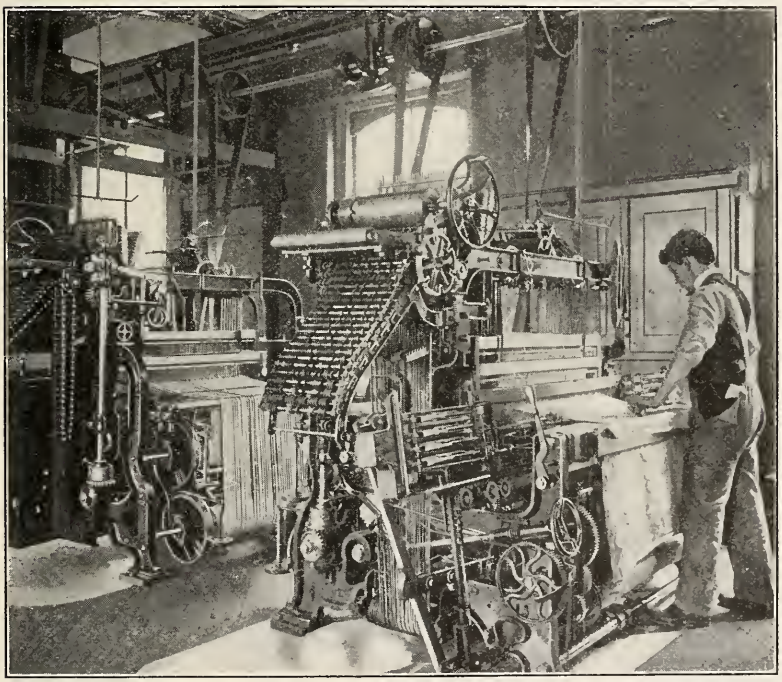
WARP PREPARATION AND WEAVING

This branch of the course is the one in which the student produces results which demonstrate his grasp of the instruction given in practically all of the other branches. The fabrics produced are from his own ideas, and, with some exceptions, are made from yarns which he has spun and dyed after having selected and prepared the raw stock. These fabrics are of a higher class than those brought out in the preceding years, and allow him to show his knowledge of structure, design and coloring. In addition to producing certain prescribed fabrics, the student is expected to execute others which he may plan, bearing in mind definite restrictions as to character and capacity of loom and limitations as to the price of the fabrics, etc., thus giving due consideration to the commercial end. The following is a brief outline of the matter included in the general instruction:

The lining-up of looms.—Starting up looms on new lines of goods.—Adjusting looms to suit the peculiar requirements of various lines of fabrics.—Adapting different kinds of looms to the same character of work.—Devices for stopping and starting take-up motions to suit special fabrics.—The production of single and double doupe effects in fabrics.—Single, double and more intricate classes of goods.—All the operations are performed by the student with only such assistance as may be called for in promoting the aims of judicious instruction.

CHEMISTRY

The chemistry studied during the final year of the course is a logical continuation of the analytical work pursued during the preceding year, only it is quantitative in character instead of qualitative. The student receives careful instruction in the use of fine balances and in the general methods employed in both gravimetric and volumetric analysis. The objects upon which the student works in the prosecution of his experiments are also confined to those which are actually employed in the mill. In this manner the subject is made

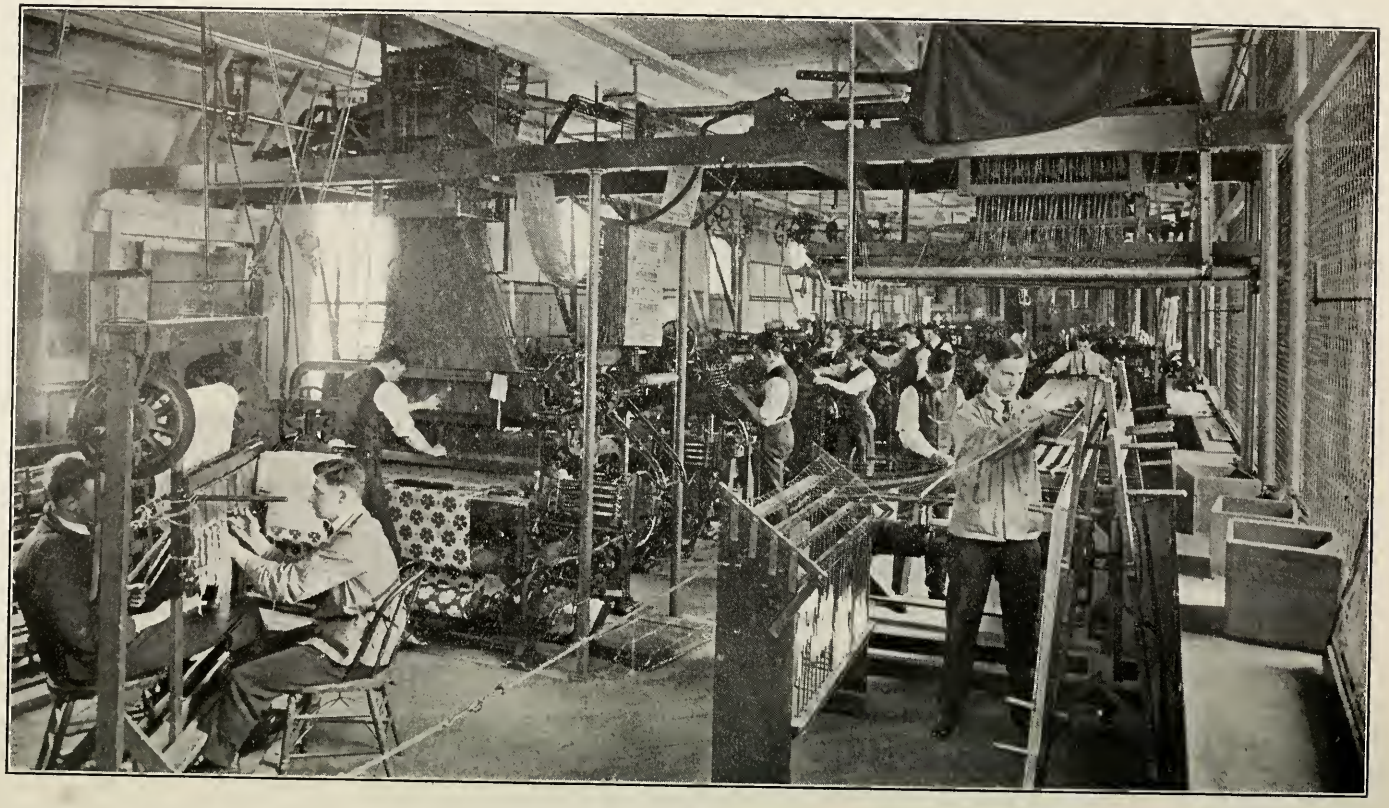


A CORNER IN THE POWER WEAVE ROOM.

concrete, and has an actual practical value to the student rather than a merely theoretical value serving for purposes of instruction only. Considerable drill and practice are also given in the methods of calculating and the intelligent interpretation of results. The objects taken for anaylsis include the various acids and alkalies, bleaching agents, soaps, oils, mordants, dyestuffs, etc. Water analysis for mill purposes is also given.

DYEING

The dyeing taken up during this year has for its chief purpose the familiarizing of the student with the different effects to be gained



VIEW IN MAIN POWER WEAVE ROOM.

in the compounding of colors and the production of different classes of dyed shades. This naturally leads on to the matching of colors, in which considerable practice is given; and during the latter part of the year the student is required to dye the yarn he employs for his woven pieces, the shades being matched by the student himself. The object of the work is to give the general textile student a comprehensive idea of the possibilities and limitations to be met with in bringing into actual existence in the finished fabrics the various color harmonies and combinations which have only a potential existence in the design.

FINISHING

The preceding year's instruction has fitted the student for the more comprehensive treatment which is given the subject in this year. He is enabled to grasp more fully the reasons for the various operations through which some of the fabrics pass in order that they may be marketed as this or as that fabric; and he is instructed in the methods of determining the form of finish employed, as well as the materials used. The outline which follows gives a general idea of the matter covered:

WORSTEDS AND WOOLENS

Fulling.—Ancient and modern methods compared.—General time of fulling on various classes of goods.—How to calculate the shrinkage in length and width to give desired weight.—How and when to flock.—What percentage of flocks it is desired to use, conditions considered.

Heat and pressure, and other conditions in fulling considered.

Gigging.—The moisture of goods in wet gigging.—Raising for various kinds of finish, "doeskin finish," "velvet finish," "dry finish," Scotch or "melton finish," "worsted finish" napping.

Steaming.—Tub steaming or boiling compared with upright steamer or gig.

Drying.—Comparison of the various drying machines in general use.—Effects of tentering in open air compared with machine drying.

Pressing.—Shearing and pressing further considered.—Final inspection.—Measuring, rolling, shading.—Causes of imperfections, their prevention and remedy.—Allowances.

Note.—Students of the second and third year courses assist in finishing all the various fabrics produced during the school term.

COTTON COURSE

This course covers a period of two years, and has been arranged so as to provide instruction in matters bearing directly on the manufacture of cottons. The broader knowledge of the subject of textiles is not attained by a pursuit of this course, but in some cases, to meet particular needs, this specialization may be said to be advantageous.

Subjects of Study—First Year

The subjects of study taken in the first year of this course are the same as those provided for the first year of the regular three-year textile course. Additional time is provided for practical demonstration in cotton-yarn manufacture, so that the student may make a more thorough study of this subject. While following the general lines referred to above, the student confines his attention to the manipulation of yarns and fabrics of cotton.

Subjects of Study—Second Year

WEAVE FORMATION

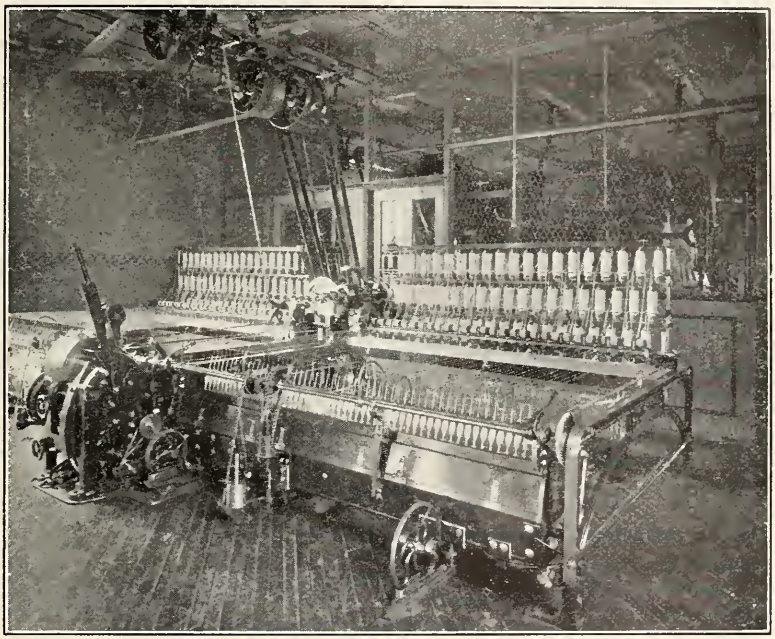
The methods of planning weaves into which an extra filling is to be introduced for the purpose of producing some figured effect, as exemplified in such fabrics as "coin spots," dotted Swisses, etc.

The principles of planning double cloth weaves, embodying the use of two or more warps and fillings.—Weave for such special double cloths, as pique or welts, Bedford cords, Marseilles, lace effects, etc.—Various methods of planning weaves which will produce ornament on the foregoing fabrics.—Weaves for different styles of imitation gauze.—Gauze weaving in one or more

doupes.—The combination of doupe with other classes of weaves.—Weaves for producing fancy effects by means of one doupe. The Lappet form of weaves.—Weaves for honeycombs and similar fabrics.—Weaves for fancy madras and cheviots.

ANALYSIS AND STRUCTURE OF FABRICS

For an outline on this subject, see page 50, which is followed in so far as it applies to cotton fabrics.

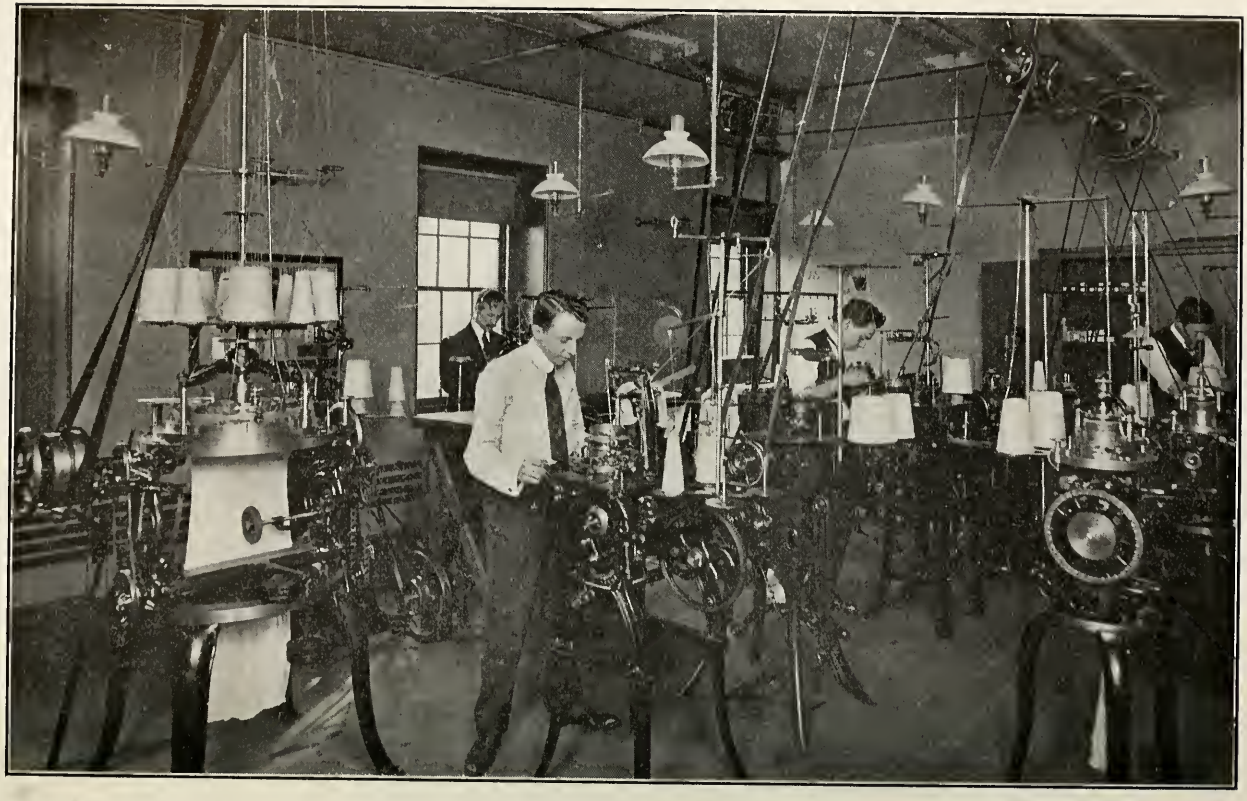


COTTON SPINNING MULE.

JACQUARD DESIGN AND COLOR

The work in this subject follows very closely that of the regular course, explained on page 51. Work of a special nature is added, such as the analysis of fabrics to obtain card-cutting directions and methods of tying up looms for the reproduction of the fabric.

Various systems of cost finding, mill book-keeping, etc., are explained, also lectures are delivered from time to time on the many problems involved in bleaching and finishing of plain and fancy cottons.

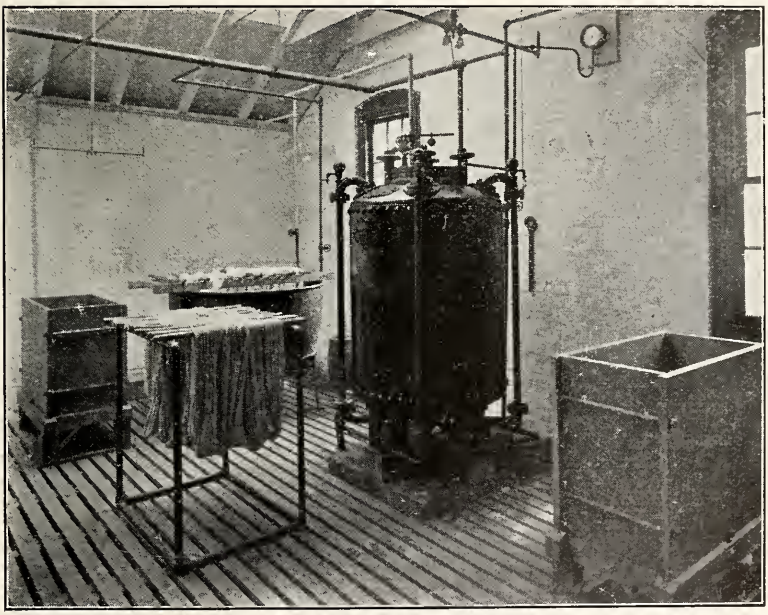


VIEW IN KNITTING DEPARTMENT.

COTTON YARN MANUFACTURE

The work of this branch of instruction will consist of a more detailed study of some of the processes covered in the First Year Course (see page 47), and a careful study of pickers, combers and the self-acting mule. Considerable attention will be devoted to the theory underlying the construction of these three machines.

General explanation of processes following the spinning, such as reeling, doubling, gassing, twisting, spooling, warping and balling yarn for the trade.—Engineering features to be considered in the construction of cotton mills: Power transmission, methods of heating, ventilation, plumbing, humidifying,



VIEW IN BLEACH HOUSE, SHOWING BOILING KIER.

fire protection, etc.—Calculation on production, cost, methods and organization.—General mill management.

The course will be conducted by means of lectures and recitations, and several essays on assigned topics will be required throughout the year. Winchester's "Cotton Yarn Manufacturing" will be used as a text-book.

PLAIN HOSIERY KNITTING

This subject is studied throughout the course, with the aim of giving the student both a knowledge of the general principles of knitting and a familiarity with the practical working of knitting machines, ribbers and loopers.

WARP PREPARATION AND WEAVING

The study of the power loom and weaving calculations will follow the outline found on page 54. The fabrics produced will be from the student's designs, and will include a line of goods of a varied and instructive nature. Doupe weaving will be performed on different styles of heddles. The student will perform all the necessary operations of dressing, beaming, twisting or drawing-in, reeding, chain building, etc.

CHEMISTRY AND DYEING

For outlines of these subjects, see pages 54 and 55.

LECTURE ROOM FOR WOOL SORTING AND GRADING.

WOOL AND WORSTED COURSE

This course, covering a period of two years, has been planned with the idea of providing for students who intend to engage in some form of the manufacture or the selling of the products of wool; hence, all reference to other fibres is eliminated, and where this course is described as following the outline of some other course, it is only done in so far as it applies to woolens or worsteds. The results to be attained by taking this course are by no means as comprehensive as those which the three-year textile course makes possible, but in certain cases it is best suited to the needs of the student. The following gives an idea of the studies which it includes.

Subjects of Study—First Year

In the first year the studies follow the general outline given for the first year of the three-year textile course in all but cotton-yarn manufacture, Jacquard design, and free-hand drawing. Woolen and worsted yarn manufacture is included in this course, and is described on page 51, while Jacquard design and free-hand drawing are omitted, a few lectures being given, however, on the principles of the Jacquard machine. The time which the other classes spend on these latter studies is devoted to additional research and practice in yarn manufacture, weaving and dyeing.

Subjects of Study—Second Year

WEAVE FORMATION

The instruction in this subject embraces the application of the general principles taught in the preceding year. The elementary weaves are applied to fabrics composed of two warps and one filling, one warp and two fillings, and to full double cloths, attention being paid not only to general underlying principles, but also to their use in connection with the requirements of definite fabrics. A brief outline of the course follows:

The manner of forming what is termed a double cloth weave and the principles involved.—Methods of stitching the two fabrics together either invisibly or for the purpose of utilizing the stitching in the production of figured effects.

Weaves for fabrics having invisible stitching, such as certain forms of trouserings and suitings, beavers, kerseys, meltons.—Weaves for fabrics in which stripes are formed by means of the stitching, such as hairlines, matellasses, cords, etc.—Figured effects produced by means of the stitching.—Weaves in which the face and back fabrics interchange, producing figures.—Weaves for crepon and other special forms of dress goods.—Weaves for chinchilla and similar styles of overcoatings.—The method of placing weaves for three-ply fabrics.

ANALYSIS AND STRUCTURE OF FABRICS

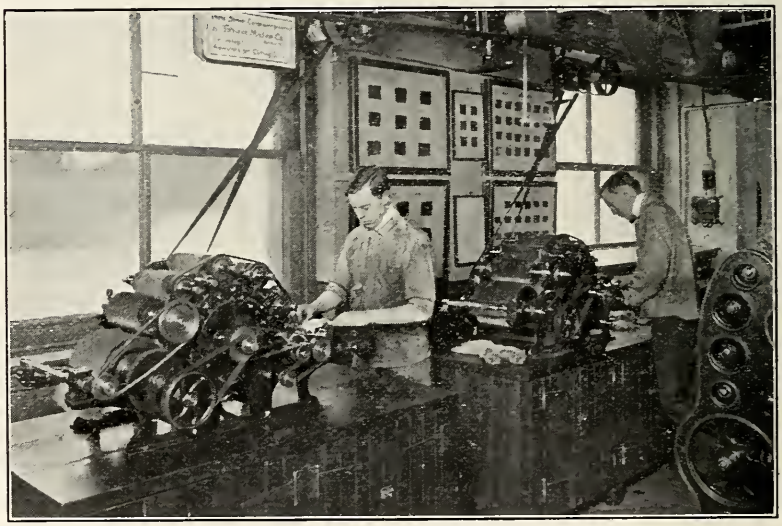
For an outline of this subject, see page 50, which is followed in all that relates to woolen and worsted yarns and fabrics.

WARP PREPARATION AND WEAVING

For outline of this subject, see page 54.

WOOL AND WORSTED YARN MANUFACTURE

The work in this subject will consist of advanced study of the subjects outlined for the previous year. Particular attention is paid, however, in this, the last year of the course, to the mechanical adjustments necessary to produce the different characters of yarn and the adaptability of these adjustments to the different qualities and characters of the raw materials from which the yarn is made. An intimate knowledge of the different parts and the methods of working of the "mule" is drilled into the student by the practical handling of the machine itself. The same general idea is carried out in the study of the machinery employed in worsted yarn manufacture. The following is an outline of the subjects:



PLAIN AND COLORED, WOOL FIBRE BLENDING, BY THE AID OF TORRANCE SAMPLING CARD.

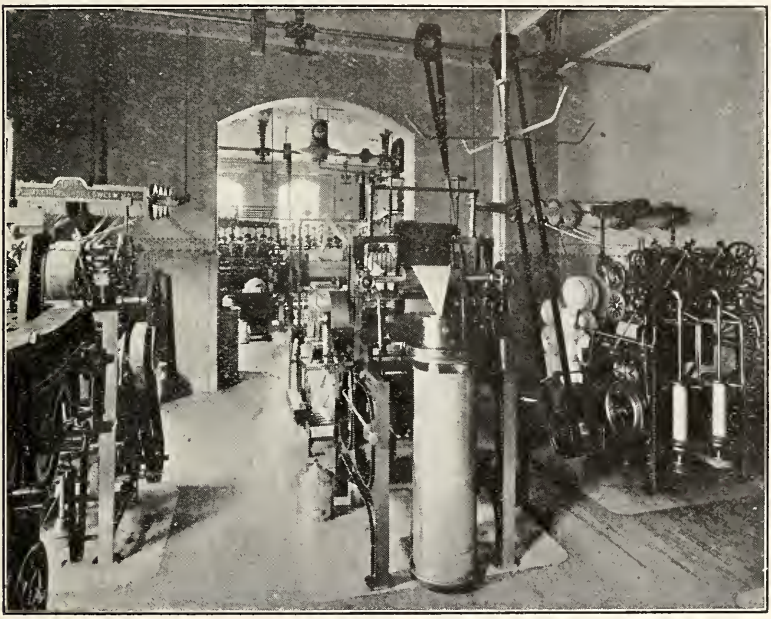
WOOL SORTING AND BLENDING

Sorting.—Uses of the sorts.—Different qualities of wool.—Calculations on shrinkages and yields in different grades of stock.—The term "Noil."—Various kinds of noils.—Mungo and shoddy.—Kinds and qualities of shoddies.—Extracts.—Wastes.—Garnetted and other forms.—Flocks.—The methods or processes by which they are produced.—Uses and clothing properties of wool substitutes.—Consideration of the size and nature of fibres which may be blended in order to produce required results in the yarn and in the finished fabric.

WOOLEN YARNS

Spinning.—The history and development of spinning.—Hand jack.—Self-operator and self-acting mule.—Present perfection of the mule.—The mule head.—Means of actuating the rolls, spindles and carriage.—Backing off.—

Winding mechanism.—The quadrant and its functions.—The builder rail and method of regulating it.—Automatic regulation of the fallers.—Changing the speed of the various parts.—Calculations for twists and drafts.—Calculations for finding the labor cost of carding and spinning.—Calculations as to net cost of stock used.—Calculations as to allowance for waste and time.—Features to be considered in laying out and equipping a woolen carding and spinning room, including power transmission, heating, ventilating, humidifying and fire protection.—Speed for the different grades of yarn.



WORSTED GILLING AND DRAWING ROOM.
One of the series of rooms devotoed to Worsted Drawing and Spinning.

WORSTED YARNS

Spinning.—Principles of spinning on the flyer, cap and ring spinning frames.—Worsted mule spinning.

Doubling and Twisting.—Principles of twisting.—Twisting, as performed on the flyer, cap, throstle and ring frames.—Effect of too much or too little twist in first or second operation.

Calculations in Full.—Drafts, doublings, stop motion for gilling and drawing.—Working out a set of drawing for any given count.—Gauge points or constants for all practical purposes.—The slide rule, and how to use it in working out drafts and other calculations.—How to find "constant" and how to use, and why.—Twisting.—Reeling.—Straight and cross reeling, also weight yarn.

General.—Oiling of the wool.—Breaking wool.—Fallers.—Ratch-drag of bobbins, lifter motion or builders.—Stop motions.—How to weigh yarn.—Averaging slubbing to make yarn weigh even.—Causes of imperfect yarn.—

Lumps.—Slugs.—Double.—Single.—Twitty.—Overdrafted.—Dragged too hard. —Too much or too little speed.—Features to be considered in laying out and equipping a worsted mill, including power transmission, heating, ventilating, humidity and fire protection.

CHEMISTRY

For an outline of this subject, see page 54.

DYEING

The subject of dyeing as outlined for this class includes a study of the chemical and physical properties of the wool fibre, with an application of this knowledge to a personal understanding of the behavior of wool during its processing through the various stages of manufacture. The general principles of scouring and bleaching are taken up, and then a study of the general methods of wool dyeing and the application of the different classes of dyestuffs to this fibre. When a general knowledge of this kind has been gained, the student next proceeds to the practical study of color compounding and shade matching. Considerable practical experience is given in the latter, and the student is also given an opportunity of carrying on some practical dyeing in the dye-house of the school.

FINISHING

Worsted and Woolens.—(Same as Second Year Regular Class.) —For outline of subjects, see page 55.

SILK COURSE

The recent surprising growth in the silk industry, especially in Pennsylvania, has prompted the School to pay particular attention to this course, which requires two years of study of silk and matters pertaining to its intelligent manufacture. The raw material is considered with its many peculiarities, together with the methods of converting it into forms suitable for wearing. A thorough training is given in the weaves used in silk fabrics, attention being called to the manner in which the various forms of interlacing appear in the goods. The manner in which silk takes dyestuff, together with its affinity for weighting materials and their effect on its strength, wearing qualities, etc., are fully considered. The many varieties of silk and mixed fabrics are carefully studied, and by analysis the student is enabled to

form accurate estimates of the size and quality of the raw materials which they contain, together with the amount of loading present. The following gives an idea of the subjects included in the course, and where reference is made to other courses it is intended that the work thus referred to shall be studied in its application to silk.

CORNER OF SILK WARPING ROOM.

Subjects of Study—First Year

In the studies of weave formation, color harmony, free-hand drawing, figured design, Jacquard design, warp preparation and weaving, chemistry, and textile fibres, the class follows the outline given for the first year of the Three-Year Textile Course, reference being made to silk throughout.

ANALYSIS AND STRUCTURE OF FABRICS

This subject is considered largely on the general lines laid down on page 44, application being made to such fabrics as taffeta, gros grains, faille française, satins, peau de soie, rhadimes, etc., both narrow and broad, in their plain and also elementary figured forms.

Methods of determining the size and quantity of silk in different samples.—

Ascertaining the reed and ends per dent.—The number of shafts used and heddles per inch, per shaft.—Correct drafts.—The dram system and the various denier systems of grading silks as to size.—Lectures on the origin and source of silk.—Thrown silk, tram and organzine. The process of throwing explained.—Spun silks.—Lectures on the production of silk threads from the waste of reeling and throwing operations.

Subjects of Study—Second Year

WEAVE FORMATION

The second year of this subject includes a study of the higher forms of weaves applicable to silk, due attention being given to those which can be used to advantage in the production of Jacquard effects. Weaves for two or more ply fabrics are studied and planned upon squared paper, each of the two or more systems of warp and filling being considered in its proper place.

Methods of producing figured effects by the use of the multiple fabric principle of weaves.—Reversible and interchangeable multiple fabrics.—Figured weaves having warp and filling flushes.—Broché effects.—Weaves for cannelé forms of ornamentation.—Satin gros grains.—Taffeta backed satins.—Double-faced satin ribbons.—Pearl, flat and pico edges.—Repp and bayadere weaves.

ANALYSIS AND STRUCTURE OF FABRICS

A general outline of the work as followed is given on page 50. The yarns and fabrics covered include those of silk of a higher and more intricate nature. Fancy armures are studied, together with such fabrics as satin damasse, brocaded taffetas and gros grains, ombre effects, various styles of ribbons, double-faced satins, etc.

JACQUARED DESIGN AND COLOR

While the work in this subject covers the points outlined on page 51, additional time is spent as follows:

Mountings.—Mountings are prepared and the practice of placing them in the loom and in tying-up is afforded for fancy silk fabrics, such as novelty dress goods, necktie stuffs, upholstery fabrics and more complex forms of fabrics. Mountings with shafts in the neck cords, and with shafts below the comberboard.

Designing.—Designs are made in color, cloth size, and enlarged to workable state for card cutting for such highly ornamental fabrics as brocades, damasks, chair coverings, labels, dress goods, etc.
Determination of weighting, estimation of size of silk before boiling off and of amount of weighting.

Card Cutting.—Cards are cut for the designs which the student makes, and card-cutting directions are worked out from various fabrics.

WARP PREPARATION AND WEAVING

For outline of study in this subject, see page 54.

CHEMISTRY

For outline of study in this subject, see page 54.

DYEING

In this subject the attention of the student is first called to the physical structure and chemical composition of the silk fibre, so that he may understand its behavior when subjected to the different chemical and physical processes used during the progress of its manufacture. The methods of conditioning, of boiling off, and bleaching of silk are studied. The application of the different classes of dyestuffs is then taken up, and various methods of mordanting and weighting are practiced in such a manner as to give the student an intelligent insight into the working of these processes. Considerable attention is paid to the methods of ascertaining the character and amount of weighting in silk goods, and also the determining of the amount of silk in mixed goods. The chemical principles underlying these matters are constantly held before the mind of the student, who acquires his knowledge in a practical manner through experimenting on concrete examples.

CLASS ROOM FOR FIGURED DESIGNING.

The great value of drawing becomes apparent to the student, as the commercial value of his production is increased by artistic method.

JACQUARD DESIGN COURSE

This course has been provided to meet a growing demand of those who desire instruction relating directly to such necessary knowledge as is required in the production of the various kinds of figured textiles, such as damask, dress goods, draperies, floor coverings, etc.

Two years are required for its completion.

Subjects of Study—First Year

In the studies of weave formation, analysis and structure of fabrics, color harmony, free-hand drawing, figured design and warp preparation and weaving, the class follows the outline given for the first year of the Three-Year Textile Course. (See pages 43 to 47).

JACQUARD DESIGN

The course of instruction in this subject has been arranged with the view of providing the student with the necessary means of planning figured effects and adapting to them the knowledge of weave formation and structure of fabric.

THE MACHINE.—A thorough study of the machine, such as is pursued by students in the regular course, page 47, is augmented by carefully measured drawings of the various types of Jacquards, and provision is made for a study of the machine in sections.

MOUNTING.—The methods of mounting according to the French and English systems are carefully studied, and practical work in the threading of comberboards and calculations for same is provided for.

The methods of obtaining enlarged repeats of pattern and fancy effects in the fabric are explained, and drawings are made of the various forms of tie-ups to produce these results.

Such forms of tie-ups and mountings are prepared as straight through, point or center tie, combinations of straight and point, repeated effects in one repeat.—Original schemes of tie-ups for fancy effects in single cloths.

DESIGNING.—Original sketches for various styles of ornamentation, from historical and floral motives, are made in the color to be used in the woven fabric.

Calculations for design or point paper for the various textures are made, and designs are enlarged to workable state from the cloth-size sketches.

FOOT AND POWER CARD STAMPING.

The filling in and placing of weaves on the enlarged design is made an important feature, and the effect the change of weave produces on the finished fabric is carefully explained.

Designs are made for such fabrics as damask, table covers, dress goods, draperies, etc.

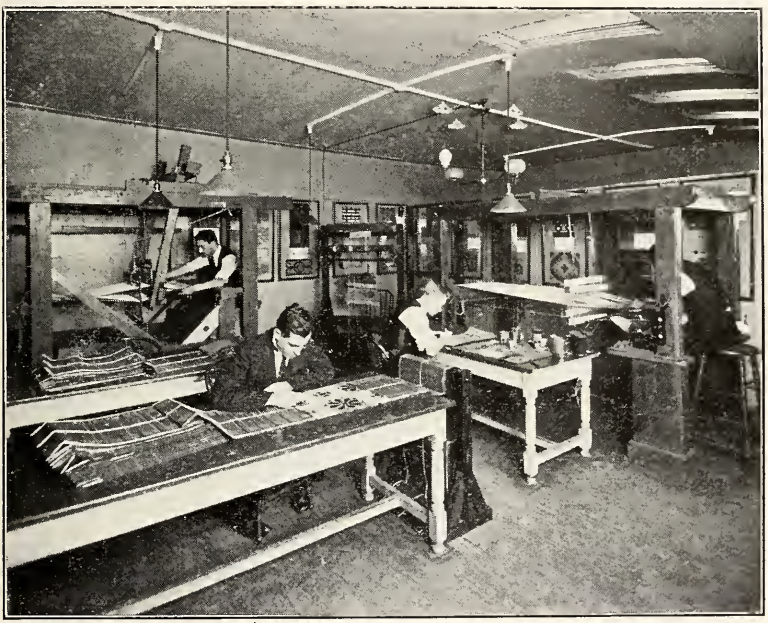
CARD CUTTING.—Considerable study is given to the fingering for French, American and fine index stamping machines, together with the practice of cutting cards for the designs made by the student.

Card-cutting directions are worked out for various effects in single and extra filling fabrics.

Subjects of Study—Second Year

WEAVE FORMATION

The work of the second year of this course being confined largely to figured effects, all the higher forms of weaves are studied in their application to the Jacquard machine. Weaves for two or more ply fabrics are studied and planned upon the squared paper, each of the two or more systems of warp and of filling being considered in its proper place. Methods of producing figured effects by the use of the



RUG AND TAPESTRY WEAVING.

mu'tiple fabric principle of weaves.—Figured weaves having warp and filling flushes.—Weaves for brocatelles, and two or three filling brocades and damasks.—Pile fabrics for floor coverings.—Weaves for all fancy figured fabrics.

ANALYSIS AND STRUCTURE OF FABRICS

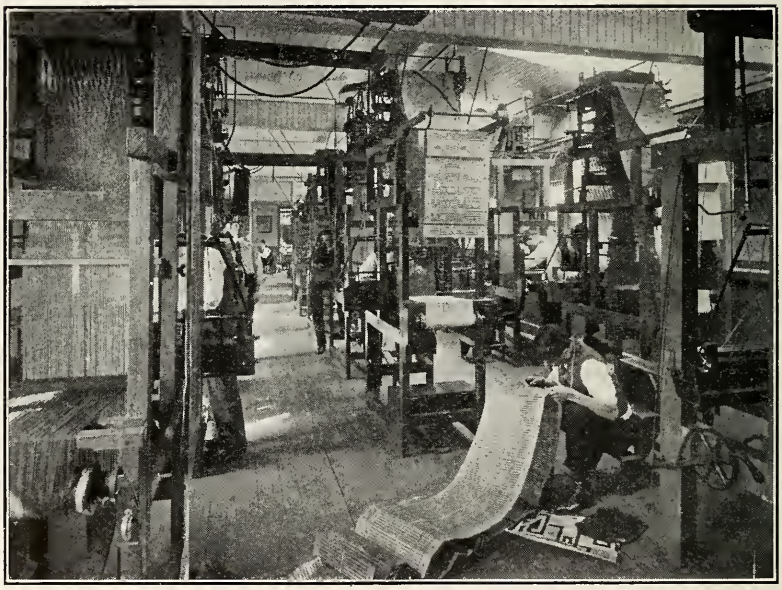
A general outline of the work as followed is given on page 50. The yarns and fabrics covered include those of cotton, wool, worsted and silk of a higher and more intricate nature. Fancy figured fabrics are studied and calculations made for the production of brocatelles, figured ribbons, shoe pulls, brocaded effects, carpets, and all classes of Jacquard fancy fabrics.

JACQUARD DESIGN

The studies of the first year are continued, and work of an advanced nature is followed. Especial attention is paid to the actual processes of producing figures in more complex fabrics, and producing designs in the cloth for the higher grades of stuffs.

THE MACHINE.—The special machines devoted to increasing speed and easier action on the warp are carefully analyzed, and measured drawings of the parts made. Machines devoted to the production of special effects are studied and their advantages noted.

The machines treated are: Raise and drop, double lift, double and single cylinder, twilling machines, drop shed machines, leno and the working of doupes and slackeners, ingrain and Brussels machines.



HAND-WEAVING LABORATORY—JACQUARD LOOMS.

MOUNTING.—The opportunity is afforded for the student to thread the comberboard and tie up looms for varied effects of design.

Mountings for controlling two or more warps and the placing of shafts in the neck cords and below the comberboard are prepared and drawings made.

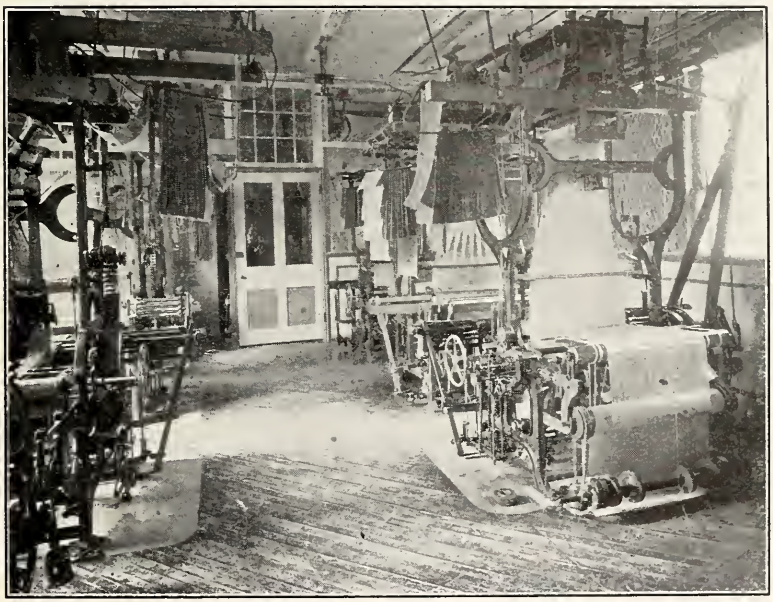
The mounting of Brussels and ingrain machines are treated at length, and opportunity is afforded the student to study the details closely.

Such mountings are prepared as follows: Section ties.—Combination of harness and Jacquard.—Shaft lashing.—Compound harness.—Carpet ties.

Designing.—As color is one of the essential features of a design, it is used to a great extent in the origination of elaborate designs.

The planning on squared or point paper of fabrics having two or more warps and fillings and the calculations for the proper size papers for the enlarged working designs are given considerable attention.

Designs are prepared in a commercial way for brocades, brocatelles, reversible robes, blankets, two and three filling damasks, gobelins, terries, ingrain carpets, Brussels, tapestry, moquette, etc., carpets, coat labels, shoe pulls, etc.

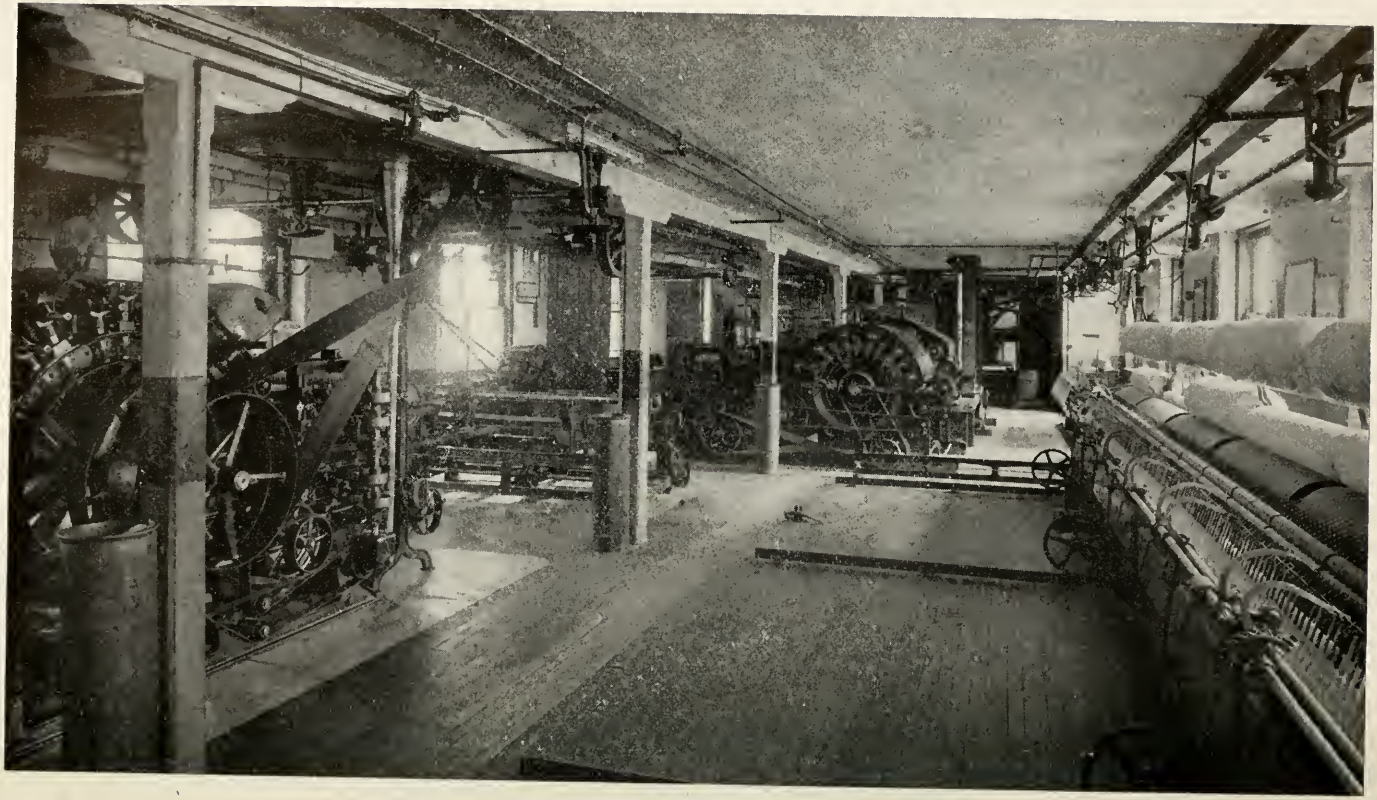


POWER WEAVE ROOM—JACQUARD LOOMS.
For silks and draperies.

Card Cutting.—Cards are cut for the designs made, and all the card-cutting directions are worked out, both from designs and the woven fabric. Mechanical methods of repeating cards and automatic devices for cutting are explained.

WARP PREPARATION AND WEAVING

For outline of this subject, see page 54.



WOOL CARDING, SPINNING, TWISTING AND REELING LABORATORY.

YARN MANUFACTURING COURSES

COURSE I—WOOL, WORSTED AND COTTON

This course has been provided to meet the needs of salesmen, knitters and consumers of yarns generally, as well as yarn manufacturers.

It has been arranged with the view of making the student thoroughly familiar with all the details and necessary calculations for successfully producing a good and serviceable yarn. Chemistry, fibre testing, and microscopy, as well as dyeing, form a very important part of this course. A limited amount of plain hosiery knitting is also included in the course. Two years are required for its completion.

First Year.—Cotton Yarn Manufacture, see page 47.

Wool and Worsted Yarn Manufacture, see page 51

Chemistry, I and II, see page 85.

Dyeing, I and III, see pages 89 and 90.

Second Year.—Advanced Cotton Yarn Manufacture, see page 65.

Advanced Wool and Worsted Yarn Manufacture, see page 68.

Chemistry, III, see page 86.

Dyeing, IV and VI, see pages 91 and 92.

COURSE II—COTTON

This course is like the above, except that the student confines his studies and practical work of the laboratories to the cotton fibre alone. One year is required for its completion.

Note.—No certificates are given for Course II.

PLAIN HOSIERY KNITTING

This subject is studied throughout the above courses with the aim of giving the student both a knowledge of the general principles of knitting and a familiarity with the practical working of knitting machines, ribbers and loopers.

VIEW IN ONE OF THE CHEMICAL LABORATORIES.

THE COURSE IN CHEMISTRY, DYEING AND PRINTING

The course in Chemistry, Dyeing and Printing extends over a period of three years, and is especially designed to give a scientific technical education to those who desire to embrace in their profession these branches of industrial technology. The primary aim of the School is to give those who intend entering upon a career in the dyeing and textile industries a sound elementary knowledge of the sciences, especially of the general chemistry which underlies these industries, and to train them to apply their knowledge with advantage and success.

The Chemical Courses in this department are ordered with reference to giving the student a scientific as well as a practical insight into the phenomena to which he is to devote his attention. A study of the materials and processes is carried on with special reference to this end. The student is made thoroughly acquainted with the chemical nature of the various fibres which he is to handle, the effect on them of the numerous chemicals and dyestuffs with which they are to be treated, and the methods of testing them with reference to the special use for which they are intended.

Dyeing is an art immediately associated with chemistry, and is one of the chief ramifications of that fundamental science. As an art it has long been practiced, but it is only of late years that scientific methods have been introduced into this study, and through this means of development it is rapidly assuming a position in the front rank of applied science.

The study of Chemistry and Dyeing is of particular value to dry-cleaners and garment dyers. This branch of the industry is necessarily very varied in character, and the value to a worker in this field, of the underlying scientific principles involved, cannot be overestimated.

The whole study of dyeing in this School is carried on with the idea of inculcating into the mind of the student a scientific conception of what he is doing; he is taught to experiment in an intelligent manner—not to take things for granted, but to know the reason why. And, moreover, his experiments are not limited to the laboratory pot and kettle, where his results are often deluding, but the student carries on his dyeing in a manner that enables him to encounter and overcome the petty difficulties and changing conditions of the mill and dye house.

The technical examination and valuations of commercial products is given especial attention, and a high standard of manipulative skill and accuracy in experimental work is insisted upon, for it is such training that fits the student for accurate and scientific results in after years, when he is called upon to make a practical application of his knowledge in an intelligent and skillful manner.

Subjects of Study for the Three-Year Course

FIRST YEAR—FIRST TERM

Chemistry I.—General Inorganic.
Dyeing I.—Physical and Chemical Properties of the Textile Fibres
Dyeing II.—Technology of Scouring and Bleaching.
Dyeing III.—Principles of Dyeing; Elementary Course.

FIRST YEAR—SECOND TERM

Chemistry II.—Qualitative Analysis.
Chemistry VI.—Chemical Calculations.
Dyeing II.—Technology of Scouring and Bleaching.
Dyeing III.—Principles of Dyeing; Elementary Course.
Dyeing IV.—Principles of Shade Compounding and Matching.

SECOND YEAR—FIRST TERM

Chemistry IIIa.—Quantitative Analysis; Gravimetric.
Chemistry IVa.—Organic Chemistry; Aliphatic Series.
Chemistry IXa.—Textile Chemistry; Analysis of Fibres, Yarns and Fabrics.
Dyeing V.—Color Mixing and Spectroscopy.
Dyeing VI.—Principles of Dyeing; Intermediate Course.

SECOND YEAR—SECOND TERM

Chemistry IIIb.—Quantitative Analysis; Volumetric.
Chemistry IVa.—Organic Chemistry; Aliphatic Series.
Chemistry V.—Industrial Chemistry.
Chemistry IXb.—Textile Chemistry; Analysis of Dyestuffs and Mordants.
Dyeing VI.—Principles of Dyeing; Intermediate Course.

THIRD YEAR—FIRST TERM

Chemistry IVb.—Organic Chemistry; Aromatic Series.
Chemistry V.—Industrial Chemistry.
Chemistry VII.—Technical Analysis.
Chemistry IXc.—Textile Chemistry; Testing Dyestuff Reactions and Adulterations.
Dyeing VII.—Textile Printing.
Dyeing VIII.—Principles of Dyeing; Advanced Course.

THIRD YEAR—SECOND TERM

Chemistry V.—Industrial Chemistry.
Chemistry VII.—Technical Analysis.
Chemistry VIII.—Chemistry of Dyestuffs.
Dyeing VII.—Textile Printing.
Dyeing VIII.—Principles of Dyeing; Advanced Course.

CHEMISTRY I. General Inorganic

The several properties of matter.—Simple and compound bodies.—Laws of chemical combination. Elements, atoms and molecules.—The atomic theory.—Chemical calculations.—Preparation, classification and chemical behavior of the chief elements and their compounds, comprising the non-metals and metals, with special reference to those of commercial importance.

This course is elementary, and is carried on by means of lectures and recitations, coupled with considerable laboratory work in experimentation on the properties and preparation of the chemical elements and their compounds.

CHEMISTRY II. Qualitative Analysis

The analytical classification of the metals.—Characteristic tests for the different elements.—Detection of bases and acids in their compounds.—Solving of analytical problems.—Writing of reactions.

This course is arranged with the view of making the student thoroughly familiar with the characteristic reactions whereby the different chemical elements may be recognized and distinguished from one another in their numerous combinations. The work is carried on largely by experiments, and the student is required to solve problems given to him for analysis.

CHEMISTRY III a. Quantitative Analysis: Gravimetric

General procedure in analytical methods; sources of error and their prevention.—Preliminary manipulations; use of analytical balances.—Estimation of water crystallization; preparation of pure salts.—Methods of precipitation and treatment of precipitates.—Typical gravimetric analyses of the metals; aluminum, chromium, iron, calcium, copper, lead, etc.—Analysis of compounds containing several metals.—Gravimetric estimation of the acid radicals; sulphuric acid, chlorine, carbon dioxide, etc.—Exercises in the analyses of alloys, minerals, etc.—Principles of electrolytic analysis.

This course is conducted by lectures, recitations and a large amount of laboratory work, at first on pure chemicals and later on commercial products.

CHEMISTRY III b. Quantitative Analysis: Volumetric

General principles of volumetric procedure.—Classification of volumetric methods.—Use and calibration of graduated apparatus. Preparation of normal and standard solutions.—Use and limitations of indicators.—Alkalimetry and acidimetry; typical analyses of acids and alkalies.—Volumetric methods by oxidation and reduction.—Volumetric methods of precipitation.—Analyses of carbon compounds by combustion.

This course is a continuation of the preceding. The subject is conducted on as practical lines as possible, and the briefer commercial methods are given wherever advisable.

CHEMISTRY IV. Organic Chemistry

General properties of the compounds of carbon.—Recognition and estimation of carbon, hydrogen, oxygen, nitrogen, the halogens, sulphur and phosphorus in organic bodies.—Calculations of percentage composition and molecular formula. Classification of organic compounds.—The aliphatic series; the hydrocarbons; halogen derivatives; alcohols; ethers; aldehydes; ketones; the fatty acids and their derivatives.—The theory of organic radicals.—Study of the esters; sulphur compounds; amines and cyanogen compounds; metallic compounds.—The unsaturated hydrocarbons and their derivatives.—The carbohydrates, and dibasic acids.—Nitrogenous and proteid substances.—The aromatic compounds; benzene and its analogues.—The aromatic nitro and amido compounds.—Diazo and azo compounds.—The aromatic acids and their derivatives.—Triphenylmethane derivatives.—Naphthalene and its compounds.—Anthracene and its compounds.—Heterocyclic compounds; the alkaloids.

This course is conducted by lectures, recitations and laboratory work. It covers in a comprehensive manner the whole field of organic chemistry, though special stress is laid on those portions particularly relating to the textile industries.

The analysis and synthesis of typical bodies is undertaken with the view of illustrating the methods of building up artificially the numerous derivations of carbon which find such an extended application in the manufacturing industries.

CHEMISTRY V. Industrial Chemistry

Industrial processes in chemical manufacture.—Fuels; water.—Sulphur and its compounds; technology of sulphuric acid.—Salt and hydrochloric acid.—The soda industries.—The chlorine industry, and chlorine compounds; bleaching agents.—The nitric acid, ammonia, and potash industries.—Fertil-

izers; cements and glass.—Ceramic industry.—Pigments.—Minor chemical preparations; peroxides, oxygen and sulphates; cyanides; permanganates.—The organic industries.—The destructive distillation of wood, bones, and coal.—Mineral oils.—Vegetable and animal oils, fats and waxes.—Soap, candles and glycerine.—Resin and gums.—Starch, dextrin and glucose; sugar.—The fermentation industries.—Explosives.—The textile industries; fibres, bleaching, mordants; dyestuffs; dyeing; printing.—Paper and leather industries.—Glue.

This course is based on text-book study, supplemented wherever necessary by lectures. Outside and supplementary reading on special topics under discussion is recommended.

CHEMISTRY VI. Chemical Calculations

Calculations of mass, volume, density and weight.—Gas pressure.—Thermometry and barometry.—Chemical formulas; molecular weight and percentage composition.—Chemical equations.—Calculations concerning heat changes.—Strength of solutions; hydrometry.—Calculations relating to the dye-house and mill, and to technical chemistry in general.—Calculation of analytical results.—Calculation relating to physical measurements of a practical value in technical chemistry.

In this course particular attention is given to the solution of technical problems.

CHEMISTRY VII. Technical Analysis

The analysis and valuation of commercial articles occurring in the dye-house and mill.—Acids, alkalies, bleaching agents, soaps, oils, tannins, mordants, and dyeing and scouring materials.—Analysis of water for industrial purposes.—Analysis of finishing materials.—Systematic qualitative examination of finishing agents.—Organic materials used in finishing; grape sugar, cane sugar, glycerine, starch, dextrin, gums, vegetable mucilages, gelatine, albumen; fats, oils and waxes; mineral oils, soaps and resins.—Classification of tests and reagents used in examination of finishing materials.—Fuel and gas analysis.

This course offers to the student a means of becoming acquainted with chemical technology and the methods of analyzing, and the valuation of commercial products. The chemical processes underlying their manufacture and application are carefully studied with reference to the needs of the student himself. A considerable number of technical analyses must be completed by each student under the guide and direction of the instructor in charge.

CHEMISTRY VIII. Chemistry of Dyestuffs

Distillation of coal tar.—Intermediate products used in the manufacture of dyestuffs.—The nitro and nitroso dyes.—Azo dyes.—Diphenyl and triphenyl methane colors.—The phthaleins.—Hydrazo dyes.—Alizarines and related colors. Indigo and other vat colors.—The coloring principles of the chief natural dyes.

The object of this course is to give the student the chemical principles underlying the manufacture of dyestuffs. Before this study can be pursued, a fair knowledge of organic chemistry must be acquired. The technology and chemistry of the coal-tar colors will be studied in a course of lectures, supplemented by considerable

SHOWING SECTIONS FOR EXPERIMENTAL DYE TESTING, SKEIN YARN AND PIECE GOODS DYEING.

experimental work in the laboratory, in which the student will be given the opportunity of making many of the intermediate compounds and dyestuffs.

CHEMISTRY IX. Textile Chemistry

(*a*) Analysis of Fibres, Yarns and Fabrics

Analysis of mixed yarns and fabrics, consisting of wool, silk, cotton, linen, artificial silk, etc.—Distinction between Tussah and mulberry silk.—Conditioning of textile materials.—Determination of sizing, and estimation of oil and grease in fabrics.—Detection of mineral oil and rosin in fabrics and yarns.—Estimation of mineral matters in fabrics.

(*b*) Analysis of Dyestuffs and Mordants

Determination of the nature and estimation of the amount of mordants on wool and cotton fabrics.—Determination of the nature of sizings and other ingredients in fabrics.—Analysis of dyestuffs for money value and colorimetric value.—Determination of exhaustion of dye-baths and mordant baths.

(*c*) Reactions of Dyestuffs and Adulterants

Testing the chemical reactions of dyestuffs.—Identification and estimation of adulterants in dyestuffs.—Determination of proper classification of dyestuffs. Capillary speed of dyestuffs; detection of mixed dyes.—Testing of dyestuffs on the fibre for the purposes of identification.—Practice in the analysis of dyes in bulk and on the fibre.

The subject of textile chemistry is a very comprehensive one, and for that reason is divided into three groups. This course is very essential to the student who desires to fit himself thoroughly for the position of dyer, chemist in a textile mill or commission house, or chemist in a dyestuff manufactory, and has been specially designed with these ends in view. A large amount of practical work in the analysis and testing of the various materials given is required of each student.

DYEING I. Physical and Chemical Properties of the Textile Fibres

Classification of textile fibres.—Study of the physiological structure, chemical constitution and reactions of the various animal and vegetable fibres.—Physical properties of the fibres.—Shoddy and wool substitutes.—Mercerized cotton and artificial silks.—Microscopy of the fibres.—Action of various chemical reagents on the fibres in the manufacturing processes.

This course is intended to make the student familiar with the various fibres that are employed for textile purposes. He is required to study the microscopy of typical fibres, and in this manner become familiar with the peculiar structure of fibres of different origin.

DYEING II. Technology of Scouring and Bleaching

Study of the impurities occurring in raw wool.—Steeping and scouring wool; use of alkalies and soaps.—By-products from scouring liquors.—Scouring cloth and yarn.—Water for scouring purposes.—Study of the solvent methods for scouring wool.—Soaps for scouring purposes.—Influence of different scouring agents and conditions on the physical properties of wool.—Scouring

and boiling-out of cotton; action of alkalies and sulphonated oils.—Bleaching of wool; stoving with sulphur dioxide; bleaching with sodium and hydrogen peroxides, potassium permanganate, etc. Bleaching of cotton; use of chloride of lime; study of the proper conditions for bleaching.—Linen bleaching.

A thorough course of lectures on the subject is given, and the theoretical study of the course is conducted by periodical examinations on the same. A constant reference is made to the chemistry of the processes, with a chemical study of the materials employed and the by-products obtained. A considerable amount of experimental work supplements the lecture course.

LECTURE ROOM—CHEMISTRY AND DYEING.

DYEING III. Principles of Dyeing; Elementary Course

(*a*) Acid and Basic Dyes

General method of wool dyeing; use of neutral and acid baths.—Afterchromed acid dyes.—Aftertreatment of acid dyes with metallic salts.—Methods of applying badly leveling dyes.—General method of applying acid dyes to cotton; use of various mordants in cotton dyeing.—Application of basic dyes to wool.—Methods of mordanting cotton and the dyeing with basic colors.—Study of the different metallic salts used for fixing. Aftertreatment of basic dyes on cotton.—Use of various tannins.

This course serves as an introduction to the real study of dyeing. The method of using the different dyestuffs is thoroughly studied in a course of lectures which work hand in hand with the experimental laboratory work. The student carries out a large number of experiments with different dyes on small test skeins. In this way he becomes familiar not only with the different methods of applying the dyestuffs, but also acquires a fund of knowledge respecting the relative shades and values of a large number of dyes, representing all the principal ones on the market. Monthly examinations are held in this subject, and the student also receives detailed criticism of all his experiments.

Besides the experimental dyeing of small test skeins, each student is required to help in the dyeing of larger quantities of various classes of goods which are operated upon in the well-equipped dye house of the school. Lots of from 1 to 50 pounds are constantly being dyed, including loose stock, yarns and piece goods, so the student has plenty of opportunity of doing considerable practical dye-house work which will prove of the highest value in his technical studies.

(*b*) Substantive Developed, Sulphur and Mordant Dyes

General methods of dyeing wool with substantive colors.—After treatment of substantive dyes on wool with metallic salts.—General methods of dyeing cotton with substantive dyes.—After treatment of cotton colors with metallic salts; increasing the fastness of cotton dyes.—Formation of developed color, and use of sulphur dyes.—Various methods of mordanting wool; use of different mordants.—Comparison of different assistants.—Different classes of alizarine dyes on wool.

This course is a continuation of the preceding, and is taken up along the same general lines. Every experiment given to the student is for the purpose of illustrating and emphasizing a definite point of instruction, and the experiments carried out proceed in a logical order of development.

DYEING IV. Principles of Shade Compounding and Making

Primary, secondary and tertiary colors.—Preparation of tints of single dyes.—Compounding of two dyes in different percentages.—Preparation of colors containing three dyestuffs.—Matching of samples on wool; on cotton.—Matching colors from one class of fabrics to another.

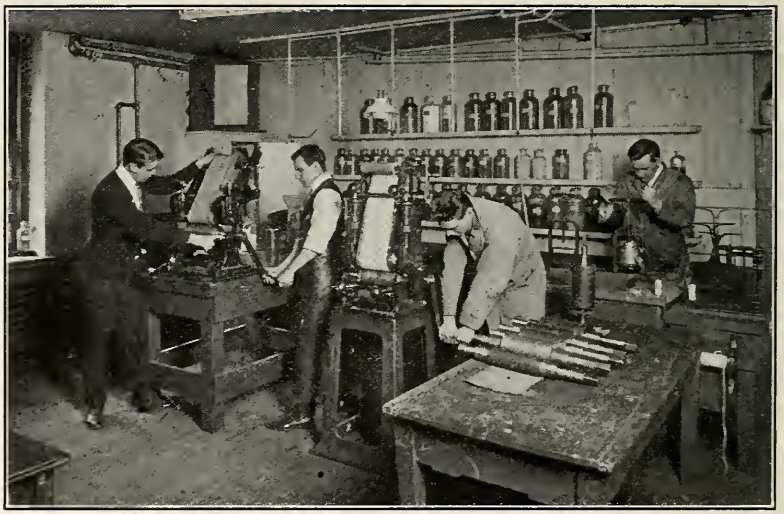
In this course the student becomes familiar with the mixing qualities of dyestuffs, and obtains a good idea of just how to synthesize a compound shade by the use of a few definite dyestuffs. The course also has great practical value, in that each student acquires a large number of standard shades prepared by himself, which in his after-work will prove of inestimable value for the proper matching of shades. The value of shade matching is early impressed on the student, and, as aptitude and accuracy in this can only be acquired by practice, each student is required to match a large number of shades on different classes of goods and with different classes of dyes. And hereinafter throughout the dyeing course he is constantly called upon to match colors to be dyed on large lots of materials.

DYEING V. Color Mixing and Spectroscopy

Study of the phenomena of light and the nature and cause of color.—Nature of color in dyestuffs and pigments.—Color absorption in the mixing of dyes.—Use of the chromatic circle in the comparison and compounding of different dyes.—The spectroscope; its construction and use; its application to the study of color in dyeing and in dyestuffs.—The tintometer and its use.—Dichroism in dyes; methods of determining the same by the spectroscope and

tintometer.—Effect of dichroism in compounding dyes and in color matching. —Effect of character of surface on colors of dyed goods.—Effect of artificial light on colors.—Study of primary, secondary and tertiary colors; tints, shades and tones of colors.—Complementary colors and color diagrams.

The laboratory is equipped with a number of the very best forms of spectroscopes, together with a Lovibund tintometer especially designed for textile work. The spectra of a number of representative dyes are plotted by the student, and the mixing qualities of the dyes are deduced therefrom; and this scientific work is supplemented by practical dye tests in the laboratory. These spectroscopic studies show the nature and properties of different dyestuffs which cannot be gained by any other means.



PRINTING LABORATORY.

DYEING VI. Principles of Dyeing; Intermediate Course

(*a*) Sulphur Dyes; Developed Dyes; Indigo and other Vat-dyes; Aniline Black; Turkey Red

Chemistry of the sulphur dyes; general methods of applying the same.—Precautions to be taken with sulphur dyes; functions of the different agents in the dye-bath.—Methods of aftertreating and topping the sulphur dyes.—The chemistry of the developed dyes; study of the dyeing, diazotizing and developing process.—Use and nature of different developers.—Methods of aftertreating and topping developed colors.—The naphthol colors.—History of indigo dyeing; methods of cultivation of plant and extraction and preparation of the dyestuff.—The chemical principles of indigo dyeing; preparation of the indigo vat.—Study of the hydrosulphite vat; the zinc vat; the copperas vat; the woad vat.—Methods of dyeing cotton with indigo; of dyeing wool.—Comparison of natural indigo with the synthetic product.—Preparation and use of indigo extract.—Testing of indigo on the fibre.—Vat dyes other than indigo.—

The chemical principles involved in the dyeing of aniline black.—Study of the necessary conditions and precautions in dyeing aniline black.—One-bath black; steam and aged blacks.—Application of aniline black to hosiery; to yarn and piece goods.—The chemical principles of Turkey-red dyeing.—Study of methods of mordanting and fixing; effect of oiling and steaming.—Comparison of old process and new process Turkey red.—Methods employed in identifying and testing Turkey red.

In this course the chief special methods of dyeing now in vogue are discussed, and by considerable experimentation on the part of the student he becomes familiar with the principles and methods underlying these processes, together with the numerous precautions necessary to carry out these methods of dyeing successfully.

(*b*) Mineral Dyes and the Natural Dyewoods

General principles of applying mineral pigments in dyeing.—Production of chrome yellow and chrome orange.—Use of iron buff and chrome green; nankeen and khaki shades.—Formation of manganese bistre; Prussian blue; iron black.—The minor mineral pigment dyes.—Study of the fastness of mineral dyes; their advantages and disadvantages.—The principal natural dye woods still in use; logwood, fustic, archil, cochineal.—Methods of applying these to wool and cotton.—The limitations of the natural dyewoods.—The minor vegetable coloring matters; cutch, gambier, etc.—Methods of testing the natural dyewoods.

The mineral and vegetable dyes are at present but little used in comparison with the extensive application of the coal-tar dyes; but their historical importance is very great, and in certain cases some of them still possess considerable value.

DYEING VII. Textile Printing

The essential elements in printing.—The machine; study of its different parts.—The different thickening agents used in printing pastes; study of their different properties and values.—Methods of preparing and mixing pastes.—Comparison of the different styles in printing.—The pigment style; nature of pigments used, and the methods of preparing the color paste; methods of aftertreating and fixing.—The direct printing style; use of substantive dyes; and the preparation of their color pastes.—Steam style with basic colors; methods of fixing.—Mordant style; use of alizarine colors and natural dyewoods.—Aniline black printing.—Developed style with diazotized colors; primuline and paranitraniline reds.—Resist style.—Discharge style; white and colored discharges.—Discharge style, with indigo and paranitraniline red.—Discharging of substantive colors; of basic colors.—Resists under aniline black.—Wool and silk printing.

There is a larger number and greater variety of chemicals and chemical processes used in printing than there is in dyeing, and it is the object of this course to give the student the underlying principles of the different methods of printing. The printing laboratory of the school is furnished with two experimental printing machines and a number of engraved rollers adapted to the various styles of printing. The course consists of an extensive series of lectures, followed simultaneously with considerable laboratory work in the prep-

aration of different colored patterns illustrating the different styles and methods in vogue, and the use of the different classes of dyestuffs.

DYEING VIII. Principles of Dyeing; Advanced Course

(*a*) Dyeing Union Goods; Half-Silks; Gloria

General principles to be followed in dyeing cotton-wool fabrics.—Adaptability of the different classes of dyestuffs.—Cross-dyeing of cotton warp goods.—Production of single color and novelty effects.—The general methods employed in dyeing cotton-silk material.—Production of single or solid colors; multi-colored effects.—The methods of dyeing gloria or wool-silk fabrics; conditions to be observed.

In this course the student combines his knowledge of the dyeing of the different fibres in order to suit the conditions dealt with. A number of novel effects are worked out by each student, as well as the production of solid colors.

(*b*) Silk Dyeing and Weighting

Study of the silk fibre in relation to its dyeing and weighting; cultivation and production of silk.—Raw silk, ecru, soupled and boiled-off silk; organzine and tram silks; spun silk; silk noils.—Methods of boiling-off silk; character of soap and water used.—Nature and uses of silk glue and boiled-off liquor.—Methods of bleaching silk.—Tussah and wild silk; boiling off and bleaching these silks.—Application of different classes of dyes to silk; the acid dyes; basic dyes; substantive dyes; mordant dyes.—Methods of brightening, lustering and scrooping silk.—Use of different mordants on silk for purposes of weighting.—Dyeing of weighted blacks; iron and tannin weighting.—Weighting of silk for dyeing colors; tin weighting.—Other methods of weighting silk.—Effect of weighting on silk fibre; proper conditions to be realized in silk weighting.—Dyeing of mixed silk goods; piece dyeing.—Testing and determination of weighting on silk goods.

The testing of weighted silks is given especial attention.

(*c*) Preparation and Dyeing of Chlored Wool; Dyeing of Artificial Silk, Jute; Preparation of Pigment Lakes

Action of chlorine and bleaching powder on wool.—Properties of chlored wool; unshrinkable wool.—Action of chlored wool towards dyestuffs; production of novelty effects.—Methods of dyeing artificial silk.—The chemistry of lake pigments.—Use of coal tar dyes in the preparation of pigments.—The minor uses of dyestuffs.

Evening School

In order to allow those employed during the day to receive some of the benefits and profit by the facilities for study which this School may afford, courses covering all branches of general textile instruction have been arranged to be carried on in the evening. In preparation of these courses, the aim has been to cover, in a general way, what is given in the day classes; the shortness of time, however, renders it impossible to treat exhaustively any particular branch, and it is expected that the instruction given in the classes will be supplemented by a considerable amount of home study.

Evening School Schedule

Showing the evenings on which are taught the subjects stated on pages 99, 101, 103, 104, 105, 106 and 107.

MONDAY	WEDNESDAY	FRIDAY
Elementary Weave Formation and Fabric Structure	Intermediate Weave Formation and Fabric Structure	Advanced Weave Formation and Fabric Structure
Intermediate Calculations and Fabric Analysis	Advanced Calculations and Fabric Analysis	Elementary Calculations and Fabric Analysis
Woolen Yarn Manufacture (Advanced)	Silk and Fine Cotton Fabric Analysis and Calculations	Loom Fixing and Study of the Power Loom
Advanced Color Harmony Special and Advanced Jacquard Design	Elementary Warp Preparation and Weaving	Elementary Jacquard Design
Wool Selecting Grading, Sorting, Blending and Calculations	Woolen Yarn Manufacture (Elementary)	Worsted Yarn Manufacture Drawing and Spinning *(See Footnote)
Hosiery Knitting	Elementary Color Harmony	Cotton Yarn Manufacture
Chemical Laboratory	Chemical Laboratory	Lecture in Elementary Chemistry
Lecture in Elementary and Advanced Dyeing	Dyeing Laboratory	Dyeing Laboratory

* This subject will be taught on Thursday nights instead of Friday, 7.30—9.30.

Courses of Study

The following are the regular courses and are recommended as advantageous outlines of study. If, however, a person does not desire to follow any of these courses, preferring to confine his attention to certain of the subjects which are given on pages 99 to 107, he can do so in accordance with the schedule shown on page 95.

See page 107 for special Jacquard and silk work.

Course A

This course is recommended to those who are interested in cottons.

	MONDAY	WEDNESDAY	FRIDAY
First Year	Elementary Weave Formation and Fabric Structure	Elementary Warp Preparation and Weaving	Elementary Calculations and Fabric Analysis
Second Year	Intermediate Calculations and Fabric Analysis	Intermediate Weave Formation and Fabric Structure	Cotton Yarn Manufacture
Third Year	Hosiery Knitting	Advanced Calculations and Fabric Analysis	Advanced Weave Formation and Fabric Structure

Course B

This course is recommended to those who desire to study the application of Jacquard Designs to Textiles in general.

	MONDAY	WEDNESDAY	FRIDAY
First Year	Elementary Weave Formation and Fabric Structure	Woolen Yarn Manufacture (Carding)	Elementary Jacquard Design
Second Year	Advanced Jacquard Design	Intermediate Weave Formation and Fabric Structure	Worsted Yarn Manufacture *(See Footnote)
Third Year	Color Harmony and Advanced Jacquard Design	Elementary Color Harmony	Advanced Weave Formation and Fabric Structure

* This subject will be taught on Thursday nights instead of Friday, 7.30—9.30.

Course C

This course is recommended to those who are interested in both cottons and woolens.

	MONDAY	WEDNESDAY	FRIDAY
First Year	Elementary Weave Formation and Fabric Structure	Elementary Warp Preparation and Weaving	Elementary Calculations and Fabric Analysis
Second Year	Intermediate Calculations and Fabric Analysis	Intermediate Weave Formation and Fabric Structure	Loom Fixing and Study of the **Power Loom**
Third Year	Wool Selecting Grading, Sorting and Blending	Advanced Calculations and Fabric Analysis	Advanced Weave Formation and Fabric Structure

Course D

This course is recommended to those who are particularly interested in wool and worsted stuffs.

	MONDAY	WEDNESDAY	FRIDAY
First Year	Elementary Weave Formation and Fabric Structure	Woolen Yarn Manufacture (Carding)	Elementary Calculations and Fabric Structure
Second Year	Intermediate Calculations and Fabric Structure	Intermediate Weave Formation and Fabric Structure	Worsted Yarn Manufacture *(See Footnote)
Third Year	Wool Selecting Grading, Sorting and Blending	Advanced Calculations and Fabric Analysis	Advanced Weave Formation and Fabric Structure

Course E

This course is arranged for those who desire to give special attention to upholstery and similar Jacquard work.

	MONDAY	WEDNESDAY	FRIDAY
First Year	Elementary Weave Formation and Fabric Structure	Elementary Color Harmony	Elementary Jacquard Design
Second Year	Advanced Jacquard Design	Intermediate Weave Formation and Fabric Structure	Card Stamping Jacquard Mounting and Weaving
Third Year	Special Jacquard Design and Coloring	Silk and Fine Cotton Fabric Analysis and Calculations	Advanced Weave Formation and Fabric Analysis

* This subject will be taught on Thursday nights instead of Friday, 7.30—9.30.

Course F

This course is recommended to those who desire to couple the study of Jacquard design with that of general fabrics.

	MONDAY	WEDNESDAY	FRIDAY
First Year	Elementary Weave Formation and Fabric Structure	Elementary Color Harmony	Elementary Calculations and Fabric Analysis
Second Year	Intermediate Calculations and Fabric Analysis	Intermediate Weave Formation and Fabric Structure	Elementary Jacquard Design
Third Year	Advanced Jacquard Design	Advanced Calculations and Fabric Analysis	Advanced Weave Formation and Fabric Structure

Course G

This course is arranged for those who desire to specialize in the study of chemistry and dyeing, both in theory and practice.

	MONDAY	WEDNESDAY	FRIDAY
First Year	Chemical Laboratory	Chemical Laboratory	Chemistry Lecture
Second Year	Lecture Elementary Dyeing (8-9 P.M.)	Dye Laboratory	Dye Laboratory
Third Year	Lecture Advanced Dyeing (8-9 P.M.)	Dye Laboratory	Dye Laboratory

Course H

		MONDAY	WEDNESDAY	FRIDAY
First Year	Elementary Chemistry	Laboratory 7.30-9.30 P. M.	Laboratory 7.30-9.30 P. M.	Lecture 8.00-9.00 P. M.
Second Year	Qualitative Analysis	Lecture 8.00-9.00 P. M.	Laboratory 7.30-9.30 P. M.	Laboratory 7.30-9.30 P. M.
Third Year	Quantitative Analysis	Laboratory 7.30-9.30 P. M.	Laboratory 7.30-9.30 P. M.	Lecture 8.00-9.00 P. M.
Fourth Year	Organic Chemistry	Laboratory 7.30-9.30 P. M.	Lecture 8.00-9.00 P. M.	Laboratory 7.30-9.30 P. M.

Subjects of Study and Fees

The following fees are for individual studies. The fee for any of the regular courses, as outlined on pages 95 to 98, is $15.00 for the term of six months.

WEAVE FORMATION

Divided into Elementary, Intermediate and Advanced, each division requiring one year. For details, see pages 43, 49 and 56. Fee for this subject, two hours per week for the term, $6.00.

ELEMENTARY WARP PREPARATION AND WEAVING

Requiring one year. For details, see pages 46-47. Fee for this subject, two hours per week for the term, $6.00.

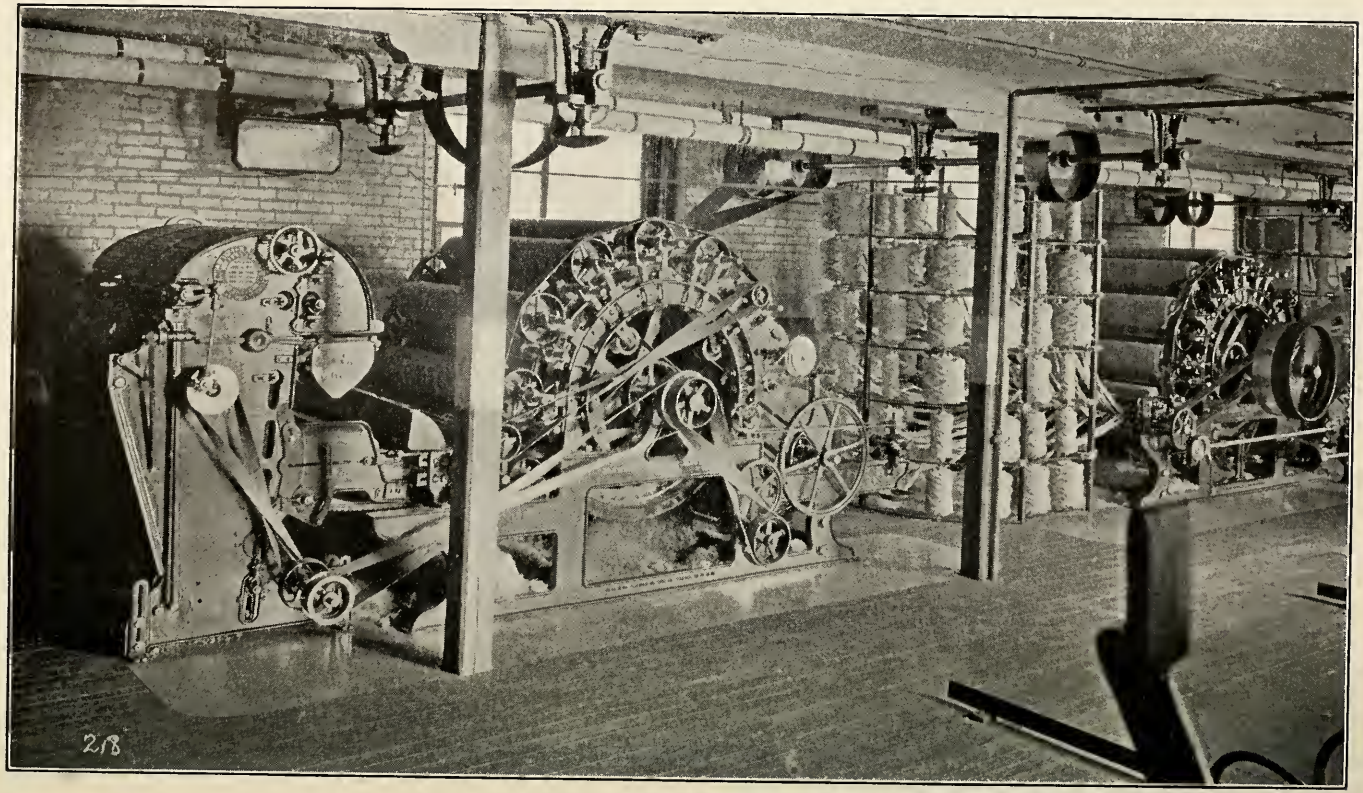
ELEMENTARY, INTERMEDIATE AND ADVANCED CALCULATIONS AND FABRIC ANALYSIS

Each division requiring one year. For details, see pages 44, 50 and 57. Two hours per week for the term, $6.00.

THE STUDY OF THE POWER LOOM
(Special Loom Fixing Class)

This course covers a period of one term or year, and is carried on by means of Lectures and practical Demonstrations. The subjects considered are partly covered by the following:

The Power Loom.—The principles governing its parts.—Relation and timing of the parts.—The various shedding mechanism, cam motion, cam and scroll motion, dobby motion.—Open and closed shed looms, and the advantages of each.—The various picking motions, the alternating pick, the pick and pick, cam and cone, sliding pick motion.—Shuttle box motions, raise and drop box, skip box, circular box, boxes controlled by cams, by a chain and by the Jacquard.—Rules and calculations for change gears for the various take-up motions. Ascertaining desired speed of shafting and size



SECTION OF WOOL CARD ROOM, SHOWING BRAMWELL FEED ATTACHED TO THE FURBUSH CARDS.

of pulley for given speed of loom.—Timing and setting of the box motions of the Knowles, Crompton, Wood, Furbush, Schaum & Uhlinger, Stafford and Whitin looms.—Knock-off motions.—Fast and loose reeds.—Harness and box chain building and care of stock. —Multiplier box chain building.—The Jacquard machine and its many forms of use.—Mounting and adjusting of single-lift, double-lift and special Jacquards.

Fee for this course, two hours per week for the term (six months), $10.00.

COTTON YARN MANUFACTURE

One year is required. For details, see page 47. Fee for this subject, two hours per week for the term, $6.00.

WOOL YARN MANUFACTURE

First year.—Instruction given on all processes through carding. Second year.—Spinning, twisting, and self-acting mule.

Two years are required. For details, see page 52. Fee for this subject, two hours per week for the term, $6.00.

WORSTED YARN MANUFACTURE

One year is required. For details, see page 53. Fee for this subject, two hours per week for the term, $6.00.

CHEMISTRY AND DYEING

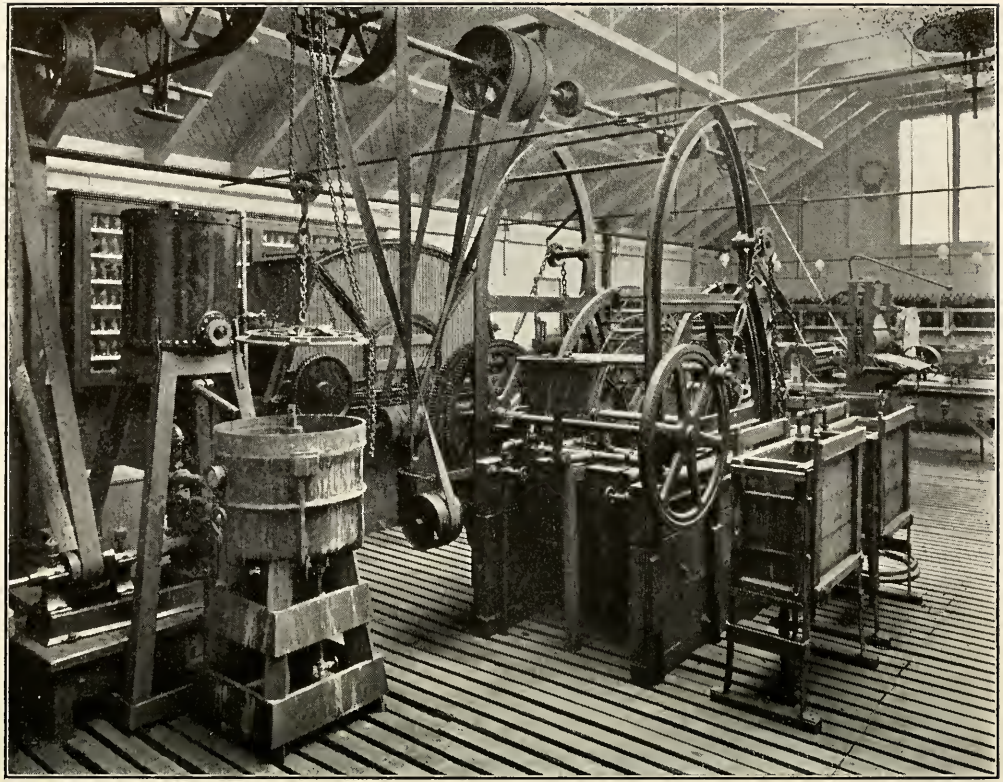
One year is required for chemistry and two years for dyeing.

ELEMENTARY CHEMISTRY

Consisting of practical laboratory experiments and lectures.

Introductory ideas on scientific methods of study and experimentation.—Simple manipulations in the use and handling of apparatus.—Chemical action.—Study of hydrogen and oxygen.—Acids, bases and salts.—Chemical notation, symbols, formulas and equations.—Study of typical compounds, with characteristic experiments illustrative of the same.—Chemical laws and calculations. —Solutions of problems.—Preparation and examination of the chief elements and their important compounds by means of laboratory experiments.

Fee for this subject, six hours per week for the term, $15.00 See "Deposits," page 108.



SECTION OF DYE HOUSE, SHOWING STOCK AND SKEIN DYEING MACHINES.

ELEMENTARY DYEING

Covering the application of the various colors to wool and cotton.

Scouring and preparation of loose wool, yarn and cloth.—Bleaching.—Application of the acid colors.—The basic colors.—The mordant colors.—The natural dyes.—Compounding shades.

Scouring and bleaching of cotton.—Methods of applying substantive colors.—Developed colors.—Basic colors.—Alizarine and natural colors.—Methods of mordanting and fixing.—Compounding of shades.

ADVANCED DYEING

Color mixing and matching.—After-treated colors.—Mineral colors.—Natural dyes.—Aniline black.—Naphthol colors.—Union dyeing.—Half-silk dyeing.—Gloria dyeing, Indigo and other vat dyes.—Sulphur colors.—Developed colors.—Resist dyeing.—Comparative money-value of dye stuffs.

In connection with laboratory work in experimental dyeing, a course of lectures is given once a week, covering the chemical and physical technology of the fibres, scouring and bleaching, methods and theory of dyeing, and special lectures on soaps, mercerizing, etc.; the lecture course covers a period of two years.

Fee for each year of the dyeing course, six hours per week, $15.00. See "Deposits," page 108.

LECTURE COURSES IN DYEING

Students may take the course of lectures in elementary or advanced dyeing, without the supplementary laboratory work. The course consists of twenty-four lectures, and no certificate is given.

The fee for the course of lectures in either elementary or advanced dyeing is $6.00.

COURSES IN CHEMISTRY

FIRST YEAR—ELEMENTARY CHEMISTRY

Introductory ideas on scientific methods of study and experimentation.—Simple manipulations in the use and handling of apparatus.—Chemical action.—Study of hydrogen and oxygen.—Acids, bases and salts.—Chemical notation, symbols, formulas and equations.—Study of typical compounds, with characteristic experiments illustrative of the same.—Chemical laws and calculations.—Solution of problems.—Preparation and examination of the chief elements and their important compounds by means of laboratory experiments.

This course is elementary, and is carried on by means of lectures and recitations, coupled with considerable laboratory work in experimentation on the properties and preparation of the chemical elements and their compounds.

The tuition fee for this subject is $15.00 for the term of 6 hours per week. See "Deposits," page 108.

SECOND YEAR—QUALITATIVE ANALYSIS

The analytical classification of the metals.—Characteristic tests for the different elements.—Detection of bases and acids in their compounds.—Solving of analytical problems.—Writing of reactions.

This course is arranged with the view of making the student thoroughly familiar with the characteristic reactions whereby the different chemical elements may be recognized and distinguished from one another in their numerous combinations. The work is carried on largely by experiments, and the student is required to solve problems given to him for analysis. He is taught how to test materials with regard to purity and the methods of detecting adulterations in the various commercial products with which he is apt to come in contact.

The tuition fee for this subject is $15.00 for the term of 6 hours per week. See "Deposits," page 108.

THIRD YEAR—QUANTITATIVE ANALYSIS

General procedure in analytical methods; sources of error and their prevention.—Preliminary manipulation; use of analytical balances.—Estimation of water crystallization; preparation of pure salts.—Methods of precipitation and treatment of precipitates.—Typical gravimetric analyses of the metals.—Analyses of compounds containing several metals.—Gravimetric estimation of the acid radicals.—Exercises in the analyses of alloys.—Principles of electrolytic analysis.

General principles of volumetric procedure.—Classification of volumetric methods.—Use and calibration of graduated apparatus. Preparation of normal and standard solutions.—Use and limitations of indicators.—Alkalimetry and acidimetry; typical analyses of acids and alkalies.—Volumetric methods by oxidation and reduction.—Volumetric methods of precipitation.—Exercises on commercial products.

In this course the student learns, by means of actual demonstration, the methods of determining quantitatively the composition of various chemical compounds. He is well drilled in the use of the balance, and is taught habits of precision, accuracy of observation and delicacy of manipulation, so necessary for success in chemical analysis. The objects employed for the analyses, as far as possible, are selected from commercial products, and are those best adapted to the immediate needs of the individual student.

The tuition fee for this subject is $20.00 for the term of 6 hours per week. See "Deposits," page 108.

FOURTH YEAR—ORGANIC CHEMISTRY

General properties of the compounds of carbon.—Classification of organic compounds.—The aliphatic series; the hydrocarbons; halogen derivatives; alcohols; ethers; aldehydes; ketones; the fatty acids and their derivatives.—Study of the esters; sulphur compounds; amines and cyanogen compounds.—The unsaturated hydrocarbons and their derivatives.—The carbohydrates, and dibasic acids.—Nitrogenous and proteid substances.—The aromatic compounds; benzene and its analogues.—The aromatic nitro and amido compounds; Diazo and azo compounds.—The aromatic acids and their derivatives.—Triphenylmethane derivatives.—Naphthalene and its compounds.—Anthracene and its compounds.—Heterocyclic compounds.

This course is elementary in character and is adapted to the needs of the student who desires the essentials of the subject. The lectures are supplemented by laboratory work which follows a syllabus of experiments.

This course will not be given unless there is a sufficient number of applicants to form a class.

The tuition fee for this subject is $20.00 for the term of 6 hours per week. See "Deposits," page 108.

DESIGN COLORING

One year required. The particular something which makes a textile fabric attractive. A point of utmost importance to every one who helps to manufacture or market the product of the mill. Without color, good patterns become flat and possess no charm; with good color, inferior patterns become leaders.

Theories are treated as applied to the textile fabric. Practical work with pigments showing the action of colors on each other, and the modification due to mixtures of raw materials and yarns, furnish much of the work in this subject.

Matching of colors in yarns and fabrics, training the eye to detect differences in tone and quality of color. Fabrics are studied with reference to the effect of weave and textures on color combinations.

Colored sketches for dress goods, shirtings, Jacquard fabrics, carpets and rugs are made, showing the application of the various principles laid down.

Fee for this subject, two hours per week for the term, $6.00.

Supplemental work of advanced nature may be followed in the making of the finished designs for rugs, carpets, upholstery and plain fabrics.

JACQUARD DESIGN

ELEMENTARY—Includes instruction in the use of the Jacquard Machine to control the warp, its construction and method of operation, arranging the various parts of the harness to produce fancy effects, threading of the comberboard for the main forms of tie-ups, as well as arranging of design on point paper, and card cutting directions to operate the Jacquard.

Work in this course includes calculations to produce fabrics on Jacquard looms with reference to both the yarns, textures, etc., and the size of machines necessary, how the different textures are laid out on point paper, and the weights of materials necessary to produce same in cloth.

One year is required, two hours per week.

ADVANCED—The advanced work is intended for those who are already familiar with the elementary work, through outside experience or owing to having taken it in the School, and whose ambition is to fit themselves for positions in which greater skill is demanded. One year is required, which is devoted to higher Jacquard design and card stamping. Fee for these subjects, two hours per week for the term, $6.00.

SPECIAL JACQUARD DESIGN

This course has been arranged for the benefit of those students who desire to specialize in rugs, ingrain, tapestry, brussels and similar floor coverings, as well as other lines of Jacquard work.

SPECIAL SILK

Requiring an attendance of one year.—This course has been arranged for the benefit of those students who are employed in the silk industry during the day, and who wish to become more familiar with the construction, analysis and calculation of silk fabrics. The studies pursued include such subjects as may be found under Analysis, etc., on pages 71 and 72. Fee for this subject, two hours per week for the term, $8.00.

WOOL SELECTION, SORTING, GRADING AND BLENDING

Instruction in this subject is given by means of lectures, which occur weekly, on Monday evenings. The year's work is divided into two portions, designated as elementary and advanced, and includes the discussion of such topics as "The Nature and Peculiarities of the Wool Fibre;" "Comparison of Different Wools;" "Varieties and Uses of Wool Substitutes;" "Grading and Sorting of Fleeces;" "The Selection of Wool;" "Calculations on Mixing;" "Cost Calculations for Mixings;" "Shrinkage," etc. Fee for this subject, one and one-half hours per week, $6.00.

REQUIREMENTS FOR ADMISSION

Applicants for admission to any of the evening classes should be at least 17 years of age, and prepared to satisfy the Director or Head of the Department that they will profit by attendance at any of these classes to which they may be admitted.

TUITION FEES

The Tuition Fee for any one of the courses outlined on pages 96 to 98 is $15.00 for the year or term. The fees

for individual studies are given under the different subjects on pages 99 to 107. All fees are payable in advance. See page 27.

DEPOSITS

Students in the Evening Course in Dyeing, Elementary Chemistry and in Qualitative Analysis make a deposit of $5.00 to cover breakage, laboratory locker rental ($1.00) and laboratory charges. Students in Quantitative Analysis and Organic Chemistry make a deposit of $10.00. After deducting such charges, the balance is returned at the close of the school session.

LOCKER DEPOSITS

Students of the Regular Textile Evening School make a deposit of $1.00 when they are supplied with a locker. Fifty cents of this amount is refunded, provided the key is returned within thirty days after the close of the school year.

HOURS OF STUDY

The Evening Classes are in session from 7.30 until 9.30 on Monday, Wednesday and Friday evenings.

EXAMINATIONS

Examinations are held at the close of year or term in all subjects taken in the Regular Courses.

CERTIFICATES

Two grades of certificates are awarded, as follows: *A Full Course Certificate* to those students who have completed three years of study in either of the following courses: A, B, C, D, E, F, G, and H, in a satisfactory manner. Among the requirements are a complete orderly record of the work as given by the instructor; an attendance of at least 75 per cent. of the time the classes are in session; and the passing of the final examinations. *A Partial Course*

Certificate to students who have completed in a satisfactory manner, including the final examinations, the following special studies:

Weave Formation .....three years
Jacquard Design .....two years
Fabric Analysis and Calculation.....three years
Cotton Yarn Manufacture .....one year
Wool Yarn Manufacture .....two years
Worsted Yarn Manufacture .....one year
Silk Fabric Analysis.....one year

MERIT SCHOLARSHIP

A merit scholarship is awarded to the student attaining the highest rating for the year's work, including the final examinations in both the first and second year Regular Textile Course.

SUPPLIES

Students must provide themselves with the necessary note books, designing paper, paints, brushes, and other materials, as indicated by the Lecturers and Instructors in the respective classes. These materials are for sale in the School at less than retail prices.

Donations

To the Institution During the Year

SCHAUM & UHLINGER, Second and Glenwood Ave., Philadelphia, Pa.—Repairing one 30-inch B Hydro Extractor. One new foundation frame. Services of machinists.

WM. H. GRUNDY & CO., 108 S. Front St., Philadelphia, Pa.—75 lbs. Half Blood Soft Waste.

HENRY L. SCOTT & CO., Providence, R. I.—One brass swift.

R. H. HOOD CO., Philadelphia, Pa.—Recovering 7 Spinning and one Roving Rollers.

E. W. FAIRCHILD, President, "Daily Trade Record," 42 E. 21st St., New York City.—Advertising the School for 13 weeks in "Daily Trade Record".

STANDARD SILK MILLS, Phillipsburg, N. J.—15 lbs. sample skeins of Raw Silk.

A. WIMPFHEIMER & BRO., 131 Spring St., New York City, N. Y.—20 lbs. Artificial Silk.

DIXON LUBRICATING SADDLE CO., Bristol, R. I.—4 doz. sets of Saddles, Stirrups, and Levers.

C. J. WEBB & CO., 116 Chestnut St., Philadelphia, Pa.—125 lbs. Wool Fleeces.

STEEL HEDDLE MFG. CO., 2110 W. Allegheny Ave., Philadelphia, Pa.—30 Heddle Frames, mounted with 3,000 Heddles.

YALE WOOLEN MILLS, Yale, Mich.—50 lbs. White and Black 2/44 Worsted Yarn, 50 lbs. Brown 2/36 Worsted Yarn.

FOLLMER, CLOGG & CO., Lancaster, Pa.—One Warping Mill for silk and fine cottons. One Beamer for above.

WM. H. GRUNDY & CO., 108 S. Front St., Philadelphia, Pa.—71 lbs. (net) soft Waste—10's quality, ½ blood.

AMERICAN CARD CLOTHING CO., American and Dauphin Sts., Philadelphia, Pa.—Card Clothing.

FALES & JENKS MACH. CO., Pawtucket, R. I.—Two 100-Teeth Crown Gears.

ABERFOYLE MFG. CO., Chester, Pa.—15 lbs. 2/120 C. S. I. Mercerized Yarn.

LINDSAY HYDE & CO., 2130 E. York St., Philadelphia, Pa.—2 Knob Catches for Reel.

THE HELLWIG SILK DYEING CO., 9th and Buttonwood Sts., Philadelphia, Pa.—Services dyeing Silk Team.

R. SERGESON & CO., Tulip and Palmer Sts., Philadelphia, Pa.—One dozen Shuttles.

SAWYER BELT HOOK CO., Pawtucket, R. I.—Assorted Belt Hooks.

I. REIFSNYDER, SON & CO., 110 South Front St., Philadelphia, Pa.—1 bag ¼ Blood Noils, 87 lbs.

BAYER & CO., 117 Hudson St., New York.—30 lbs. Dye samples.

GEISENHEIMER & CO., 136 Chestnut St., Philadelphia, Pa.—4 oz. Dye samples.

CASSELLA COLOR CO., 126 S. Front St., Philadelphia, Pa.—8 lbs. Dye samples, and 10 lbs. Sodium Nitrite.

FARBWERKE HOECHST CO., 104 Chestnut St., Philadelphia, Pa.—1 lb. Hydrosulphite and 4-oz. samples.

KALLE & CO., 536 Canal St., New York, N. Y.—23 4-oz. sample Dyes.

BADISCHE CO., 111 Arch St., Philadelphia, Pa.—8 4-oz. sample Dyes.

BERLIN ANILINE WORKS, 122 Walnut St., Philadelphia, Pa.—6 4-oz. sample Dyes.

ANDREYKOVICZ & DUNK, 58 N. Front St., Philadelphia, Pa.—1 lb. Dyestuffs, and 4-oz. sample Dyes.

ARNOLD HOFFMAN CO., Delaware Ave. and Green St., Philadelphia, Pa.—10 lbs. Wheat Starch, and 10 lbs. Dextrin, 5 lbs. Gum Tragacinth, 1 lb. Gum Arabic.

ROESSLER & HASSLACHER CHEMICAL CO., 100 William St., New York, N. Y.—10 lbs. Sodium Peroxide, and 1 lb. Sodium Perborate.

BERLIN ANILINE WORKS, Philadelphia, Pa.—2 lbs. Dyestuffs.

CORN PRODUCTS REFINING CO., New York, N. Y.—53 lb. samples of Process samples and products from Corn.

ANDREYKOVICZ & DUNK, Philadelphia, Pa.—2 lbs. 4 ozs. of Dyestuffs.

BADISCHE CO., 128 Duane St., New York.—15 4-oz. samples of Dyestuffs.

GENERAL CHEMICAL CO., Philadelphia, Pa.—1 carboy Muriatic Acid, and 1 carboy Sulphuric Acid.

SAWYER BELT HOOK CO., Pawtucket, R. I.—Assorted Belt Hooks.

AMERICAN DYEWOOD CO., Chester, Pa.—8 1-lb. samples of Dyewood Extract.

ERNST BISCHOFF & CO., New York, N. Y.—1 lb. Hexoran.

Courtesies Extended

Schaum & Uhlinger, Philadelphia, Pa.—Erben-Harding Co., Philadelphia, Pa.—Aberfoyle Mfg. Co., Chester, Pa.—Firth & Foster Co., Philadelphia, Pa.—J. R. Foster & Sons, Philadelphia, Pa.—F. H. Milner, Philadelphia, Pa.—"Fibre and Fabric," Boston, Mass.—"Dry Goods Economist," New York, N. Y.—"Textile-World-Record," Boston, Mass.—"Textile Manufacturers' Journal," New York, N. Y.—"American Wool and Cotton Reporter," Boston, Mass.; "American Silk Journal," New York, N. Y.—"Daily Trade Record," New York, N. Y.—"Textile Manufacturer," Charlotte, N. C.—"Men's Wear," New York, N. Y.—"Textile Colorist," Philadelphia, Pa.—"American Gentleman," New York, N. Y.—"Cotton," Atlanta, Ga.—Saco-Lowell Shops, Lowell, Mass.—Thomas Halton's Sons, Philadelphia, Pa.—Philadelphia Textile Machinery Co., Philadelphia, Pa.—John Royle & Sons, Paterson, N. J.—Crompton & Knowles Loom Works, Worcester, Mass.—Sauquoit Silk Mfg. Co., Philadelphia, Pa.—The Hellwig Silk Dyeing Co., Philadelphia, Pa.—American Card Clothing Co., Philadelphia, Pa.—Chas. Bond Co., Philadelphia, Pa.—Mr. Harry Jones, Philadelphia, Pa.—Mr. Chas. S. Althouse, Reading, Pa.—American Moistening Co., Boston, Mass.—John M. Harris & Co., New York, N. Y.—R. H. Hood Co., Philadelphia, Pa.—H. W. Butterworth & Sons Co., Philadelphia, Pa.—Cold Spring Bleaching and Finishing Works, Yardley, Pa.—Yewdall & Jones, Philadelphia, Pa.—Jacob Miller, Sons & Co., Philadelphia, Pa.—Concordia Silk Co., Philadelphia, Pa.—Mr. Isaac H. Clothier, Philadelphia, Pa.—E. L. Mansure Co., Philadelphia, Pa.—Standard Machine Co., Philadelphia, Pa.—Stead & Miller Co., Philadelphia, Pa.—Moss Rose Mfg. Co., Philadelphia, Pa.—Angel Belt Hook Co., Providence, R. I.

Influence of the School

A SUMMARIZED ESTIMATE OF THE WORK OF THE SCHOOL

Some idea of the influence of the School in this mighty industry may be gleaned from the following:

Establishments in which students have become owners or partners; Capitalization, $7,000,000; Broad Looms, 2,144; Narrow Looms, 5,565; Narrow Fabric Looms, 176.

Establishments in which students have become managers or superintendents: Capitalization, $16,000,000; Looms operated, 18,364, to which must be added the necessary spinning, dyeing, and finishing labor and machinery.

Establishments in which students have become designers: Capitalization, $5,500,000; Looms operated, 13,000.

A considerable number of students have engaged in the marketing of goods, having become commission men, manufacturers' agents, salesmen and stylers of fabrics. A like number have become managers, chemists and foremen dyers in establishments representing a capitalization of $5,000,000.

A Partial List of Former Students of the School with their Occupations

For a corresponding list of former students of the School of Applied Art, see the circular of that School

(Pupils are requested to assist the Director in correcting the List.)

ABBOT, WM. T., with *New York Commercial,* New York.
ADAMS, ALBERT E., with Wyoming Spinning Co., Norristown, Pa.
ALEON, A. P., of A. Aleon's Sons, Oriental Rugs, New York.
ALGEO, BRADLEY C., Assistant Director, Philadelphia Textile School.
ALTHOEN, HARRY, with Hamilton Web Co., Hamilton, Canada.
ALTHOUSE, C. SCOTT, President, Neversink Dyeing Co., Reading, Pa.
ANDREAE, FRANK W., President and Supt., Yale Woolen Mills, Yale, Mich.
ANDREAE, RUDOLPH E., with Yale Woolen Mills, Yale, Mich.
ANDREWS, EDWARD W., Loom Fixer, Philadelphia, Pa.
ANNER, HENRY, Jr., with Standard Silk Mills, Phillipsburg, N. J.
APELDORN, ERNEST F., Jr., with Apeldorn & Beatty Co., Philadelphia, Pa.
ARMSTRONG, HERBERT, President, Armstrong Woolen Co., Detroit, Mich.
ARNOLD, W. W., Jr., Supt., Manchester Cotton Mills, Manchester, Ga.
ASHE, EDWARD J., with Standard Knitting Mills, Knoxville, Tenn.
ASPDEN, NEWTON J., of Bennett & Aspden, Philadelphia, Pa.
AUNGST, J. T., Dyer, with R. Wolfenden & Sons, Attleboro, Mass.
BAENY, ROBERT M., with Bengal Silk Mills, Central Falls, R. I.
BAKER, JOEL R., with W. E. Tillotson Mfg. Co., Pittsfield, Mass.
BALDWIN, ABRAHAM R., firm of Curtiss & Warren, Chicago, Ill.
BARNET, HENRY B., Manufacturer of Shoddies, Albany, N. Y.
BARR, D. M., Proprietor, Barr Mfg. Co., Philadelphia, Pa.
BARTELT, MORRIS W., Designer, Wm. Ayres & Sons, Philadelphia, Pa.
BATHGATE, GEORGE H., with Niantic Mfg. Co., East Lyme, Conn.
BATTEY, DONALD E., Firm of Battey, Trull & Co., New York, N. Y.
BATTEY, W. EARLE, Firm of Battey, Trull & Co., New York, N. Y.
BECKWITH, PAUL B., with United Coal Co., New York, N. Y.
BEHM, ALBERT, with John & James Dobson, Philadelphia, Pa.
BELL, HAROLD C., with Ackerman, Bell & Co., New York, N. Y.
BENDHEIM, HERBERT D., with Nat'l Cloak and Suit Co., New York, N. Y.
BENNETT, CHARLES R., with *American Wool and Cotton Reporter,* Philadelphia, Pa.
BENNINGHOFEN, PAUL, with Miami Woolen Mills, Hamilton, Ohio.
BENTON, S. IRVING, Salesman, with The Bayer Co., Inc., Philadelphia, Pa.
BERRY, FRANK, Designer and Assistant Superintendent, Paul Whitin Mfg. Co., Northbridge, Mass.
BERTOLET, ELMER C., Instructor Dyeing, Philadelphia Textile School.
BICKHAM, S. A., with Aberfoyle Manufacturing Co., Chester, Pa.
BINGER, WALTER D., Southern Rep. of Peierls, Buhler & Co., New York, N. Y.
BINZ, FERDINAND, Manufacturer of Carpets, Philadelphia, Pa.

BISHOP, CHAUNCEY R., Mgr., Salem Woolen Mills Store, Salem, Oregon.
BISHOP, CLARENCE M., firm of Pendleton Woolen Mill, Pendleton, Oregon.
BISHOP, ROY T., firm of Pendleton Woolen Mill, Pendleton, Oregon.
BLACKBURN, FREDERICK, with Airlie Mills, Hanover, Conn.
BLACKWOOD, WILLIAM, Head Designer, with Bradford Mills, Phila., Pa.
BLUN, F. MELVILLE, with R. A. Tuttle Co., New York, N. Y.
BOND, CHARLES, President of Chas. Bond Co., Mill Supplies, Phila., Pa.
BOND, JOHN, Manufacturing Clothier, Denver, Colo.
BOND, W. E., Designer, Glendale Elastic Fabrics Co., Easthampton, Mass.
BOOTH, HARRY, with Aberfoyle Mfg. Co., Chester, Pa.
BOOTH, JAMES, Salesman, Smith & Furbush Machine Co., Philadelphia, Pa.
BOSETTI, CHAS. P., Asst. Supt., with Concordia Silk Co., Philadelphia, Pa.
BOSWORTH, H. H., Supt. Ribbon Department, John B. Stetson Co., and President, Delaine Mills, Philadelphia, Pa.
BOYLE, JAMES J., with A Boyle & Bro., Philadelphia, Pa.
BRADY, JOHN T., with Waucantuck Mills, Uxbridge, Mass.
BREADY, E. K., Proprietor, Girard Worsted Co., Philadelphia, Pa.
BREWIN, HARRY, President, Peerless Silk Dyeing Co., Philadelphia, Pa.
BREWSTER, ELDON F., with Badische Co., Philadelphia, Pa.
BREWSTER, FREDERICK S., Assistant Designer, with American Mills Co., Rockville, Conn.
BRIDGE, SAMUEL, Superintendent, Marshall & Co., Fall River, Mass.
BRIDGER, J. L., Gen. Mgr., Bladenboro Cotton Mills, Bladenboro, N. C.
BRIGGS, EVERETT A., with Farr Alpaca Co., Holyoke, Mass.
BRIGGS, LE ROY, Head Dyer, Hardwick & Magee Co., Philadelphia, Pa.
BROADHEAD, IRVING H., Supt., Acme Worsted Mills, Jamestown, N. Y.
BRODBECK, H. C., Jr., with H. C. Brodbeck, Sr., Cincinnati, Ohio.
BROMLEY, HOWARD H., of Bromley Bros. Carpet Co., Philadelphia, Pa.
BROOKE, H. CARROLL, with Berlin Aniline Works, Philadelphia, Pa.
BROOKS, EDWIN F., Firm of Brooks, Mortland & Co., New York, N. Y.
BROOM, ARNOTT R., with Jos. R. Foster & Son, Philadelphia, Pa.
BROOM, HARRY, Manager, Kalle & Co., Inc., Philadelphia, Pa.
BROUGHTON, H. R., Designer, Standish Worsted Co., Plymouth, Mass.
BROWN, A. MAURICE, with George Brown Sons, Lenni, Pa.
BROWN, E. H., Yarn Manufacturer, with Wilson H. Brown & Bro., Germantown, Philadelphia, Pa.
BROWN, FREDERICK, Supt., Mansfield Elastic Web Co., Mansfield, Ohio.
BROWN, HARRY G., with Edward S. Hyde Co., Philadelphia, Pa.
BROWN, J. W., President, Cowpens Mfg. Co., Cowpens, S. C.
BROWN, S. W., Superintendent, with Wm. W. Brown, Worcester, Mass.
BROWN, WILLIAM P., with Follmer, Clogg & Co., Lancaster, Pa.
BRUNER, FRANCIS A., Manufacturer, Frankford, Philadelphia, Pa.
BUCK, LEON H., Secretary, R. A. Weber Silk Dyeing Co., College Point, L. I.
BURT, JOHN, formerly of Southwark Mills Co., Philadelphia, Pa.
BUSH, THOMAS G., with Massachusetts Mills, Lindale, Ga.
BUTTERWORTH, CHAS. W., Editor *American Gentleman,* New York, N. Y.
BUTTERWORTH, GEORGE, Public Warp Beamer, Philadelphia, Pa.
CADY, ALANSON, Designer, Hoosac Cotton Mills, No. Adams, Mass.
CAMERON, JAMES B., Yarn Salesman, with Cannon Mills, Philadelphia, Pa.
CAMPBELL, ARCHIBALD, Superintendent, with Hardwick & Magee Co., Philadelphia, Pa.
CAMPBELL, JOHN J., Dyer and Finisher Worsted Goods, Philadelphia, Pa.
CAMPBELL, J. W., with Wm. Whitman Co., New York, N. Y.
CAREY, THOMAS J., Jr., Assistant Designer, Livingston Worsted Co., Washington, R. I.

CARSON, ROBERT J., of Robert Carson & Sons, Philadelphia, Pa.
CARY, ERNEST P., Supt., Empire Mfg. Co., Lockport, N. Y.
CASWELL, C. A., Manufacturer of Woolen Goods, Bloomsburg, Pa.
CHADWICK, BERTRAM, Instructor, School of Industrial Art, Phila., Pa.
CHALK, WILLIAM G., Vice-President and General Manager, Gothic Wilton Rug and Carpet Co., Philadelphia, Pa.
CHANALIS, BENJAMIN, Buyer and Manager, Montgomery Ward & Co., Brooklyn, N. Y.
CHAPPATTE, JOS. E., with E. L. Mansure Co., Philadelphia, Pa.
CHEW, D. S. B., Cotton Goods Manufacturer, Philadelphia, Pa.
CHIPMAN, W. EVAN, Secretary and Treasurer, Chipman Knitting Mills, Easton, Pa.
CHRIST, HERBERT, of Christ Bros. Mfg. Co., Philadelphia, Pa.
CLAASSEN, ARTHUR C. W., with Wade Mills, Philadelphia, Pa.
CLARK, ARTHUR F., with Burch, Bailey & Co., New York, N. Y.
CLARK, J. C. F., Assistant Secretary and Treasurer, and Superintendent of Enterprise Cotton Mills, Enterprise, Ala.
CLARK, JOHN, Head Dyer, Waverly Mills, Frankford, Philadelphia, Pa.
CLARK, JOHN W., Superintendent, Erwin Bleaching and Finishing Plant, W. Durham, N. C.
CLARK, RUFUS W., Jr., Mgr., T. H. Eaton & Son, Detroit, Mich.
CLAYPOOLE, J. A., Overseer, Peter Graff & Co., Worthington, Pa.
CLAYPOOLE, J. NORMAN, with Peter Graff & Co., Worthington, Pa.
CLEVELAND, HENRY M., Asst. Treas., Tucapan Mills, Tucapan, S. C.
CLIFTON, A. T., with Texas Cotton Mills, Hillsboro, Texas.
CLOUTIER, PAUL J., with Lewiston Bleachery and Dye Wks., Lewiston, Me.
COCKROFT, JAMES H., Salesman, Cassella Color Co., Boston, Mass.
COE, HERBERT G., Asst. Supt., Brookside Mills, Knoxville, Tenn.
COLLINGWOOD, JOSEPH, Dyer, with Farr Alpaca Co., Holyoke, Mass.
COLLINS, GEORGE H., with Michael Collins, Collinsville, Mass.
CONDON, MORRIS G., Overseer, with James Doak, Jr., & Co., Phila., Pa.
CONE, CLARENCE N., Vice-President, Minneola Mfg. Co., Gibsonville, N. C.
CONNELL, ROBERT S., Designer, Shelbourne Mills, Philadelphia, Pa.
CONNELLY, JOHN, with Aberfoyle Mfg. Co., Chester, Pa.
COOPER, WARREN F., with American Viscose Co., Marcus Hook, Pa.
CORCORAN, THOS. M., Supt. Shackamaxon Worsted Co., Philadelphia, Pa.
COTSHOTT, FRED., Assistant Supt., with J. Cotshott, Philadelphia, Pa.
COUPE, ALBERT, Asst. Supt., with Portland Woolen Mills, St. Johns, Ore.
COX, RICHARD S., Instructor in charge of Jacquard Design and Color Work, Philadelphia Textile School.
CRABTREE, JOHN A., firm of Wm. Crabtree & Sons, Montgomery, N. Y.
CRAWFORD, DONALD D. P., with Warner J. Steel, Bristol, Pa.
CROWTHER, JOHN, of Shannock Narrow Fabric Co., Pawtucket, R. I.
CROZER, Geo. K., Jr., with J. P. Crozer's Sons, Upland, Pa.
CRUMP, WALTER M., Supt., Peck Mfg. Co., Warrenton, N. C.
CUMMINGS, PARKER, with Geiger & Spring, New York, N. Y.
CUTCHIN, CLARENCE I., Designer, American Mills Co., Waterbury, Conn.
DAMON, WM. C., Mfgrs. Agent, A. L. Sayles & Sons, Pascoag, R. I.
DANA, PHILIP, Pres. and Asst. Treas., Dana Warp Mills, Westbrook, Me.
DANCY, HIBBERT H., with R. R. Dancy & Co., Houston, Texas.
DANNERTH, FREDERIC, Jr., Consulting Chemist, Passaic, N. J.
DAVENPORT, DON. A., Designer, Norristown Woolen Co., Norristown, Pa.
DAVEY, EDWARD G., Superintendent Yarn Mill, McCleary, Wallin & Crouse, Amsterdam, N. Y.
DAVIDSON, H. O., Supt., Eagle and Phoenix Mills, Columbus, Ga.

DAVIS, SAMUEL H., Styler, with Galey & Lord Commission Co., New York, N. Y.
DAVISON, ALEX. YOUNG, Manager, F. E. Atteaux & Co., Boston, Mass.
DAWSON, ROBERT L., with American Woolen Co., New York, N. Y.
DEAN, M. O., Supt., Dwight Mfg. Co., Chicopee, Mass.
DEMPSTER, ROBERT B., with Brookside Mills, Knoxville, Tenn.
DENKHAUS, F. C., with Verlenden Bros., Inc., Darby, Pa.
DENNY, GEORGE A., of the Diamond Textile Machine Works, Phila., Pa.
DIETZ, JOHN, Carpet Designer, Philadelphia, Pa.
DILLON, L. M., Supt., James J. Regan Mfg. Co., Rockville, Conn.
DIMENT, JAMES S., Instructor Cotton Spinning, Philadelphia Textile School.
DOOLEY, THOS. F., with Dayton Hosiery Mills, Dayton, Tennessee.
DUKE, LAWRENCE, with Commonwealth Cotton Mills, Durham, N. C.
DUNMORE, W. T., Jr., Overseer, Utica Knitting Co., Utica, N. Y.
DUNN, ERVIN S., Treas., Dunn Worsted Co., Woonsocket, R. I.
DUVAL, GEO. M., Supt., Sec. and Treas., Social Circle Cotton Mills, Social Circle, Ga.
EASTON, ROBERT B., Secretary, Waypoyset Mfg. Co., Central Falls, R. I.
EASTOP, RAYMOND W., Supt., Ansonia O. & C. Co., Ansonia, Conn.
EATON, ROBERT K., Asst. to Agent, Cabot Mfg. Co., Brunswick, Maine.
EDDY, H. W., Jr., with Charlotte Supply Co., Charlotte, N. C.
EDDY, LOUIS H., Dyestuff Broker, Westerly, R. I.
EICK, EMIL F., Jr., with Royle & Pilkington Co., Mt. Holly, N. J.
EILERS, A. J., with Orr Felt and Blanket Co., Piqua, Ohio.
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FLEISHER, WILLIS, firm of Shelbourne Mills, Philadelphia, Pa.
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FOSTER, HALLET J., with Ackerman & Bell, New York, N. Y.
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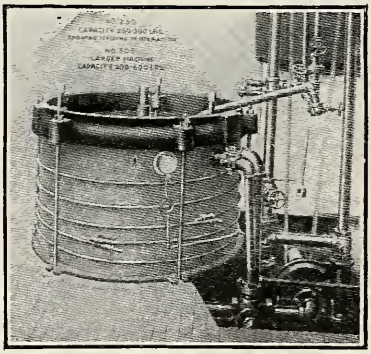

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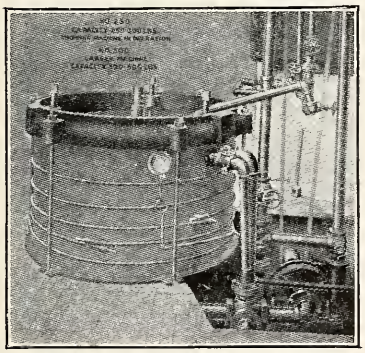

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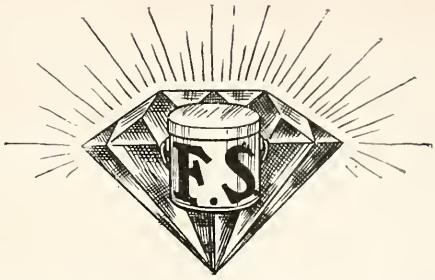

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